

FEBRUARY 20, 1956 50 Cents

AVIATION WEEK

A McGRAW-HILL
PUBLICATION



Chance Vought Regulus
Learns to Live at Sea

Japanese Industry
Arrives at Jet Age

First in Constant Speed Drives...



New electrical concept in F-105A attributed to Sundstrand Constant Speed Drives

The advanced Air Force F-105A all-weather supersonic interceptor, built by Convair, incorporates the new concept in aircraft systems. Here, due to the Sundstrand Constant Speed Drive, is an ultramodern constant frequency ac system providing plenty of stable power, with heavy overload capacity under all flight conditions. Here is reliable power for optimum operation of electronic devices which make the F-105A so modern, unique, all weather weapon. And here is another example of how the new concept in electrical systems... started by Sundstrand's Constant Speed Drive... meets the challenge of today's... and tomorrow's... fast, high flying aircraft. Can we help you?



New Electrical Horizons...

one opening to design engineers, through co-operation between engine and aircraft manufacturers and Sundstrand. With this new concept in aircraft systems, expect remarkable advances in operation and performance of tomorrow's aircraft.

SUNDSTRAND AVIATION

Divisions of Sundstrand Machine Tool Company ROCKFORD, ILLINOIS Vienna Sales Office, Hawthorne, California
CONSTANT SPEED DRIVES • AIRCRAFT ACCESSORIES

**WHY
DOES AN ATHLETE
"WARM UP"?**



**-the answer is the key to
the peak performance of Goodyear Airplane Tires**

The purpose of an athlete's "warm up" is commonly said to be to "loosen up" his muscles. Actually the reverse is true. Through this exercise he is actually tightening his muscles—tensing them up and getting them ready to deliver top performance.

In this lies the key to the top performance of the Triple-Tempered 3-T Nylon Cord built into Goodyear Aviation Tires.

For this specially processed Nylon is an organic fiber—and as such reacts very much like human skin and muscle. You might say it has a "memory"—when subjected to tension and strain, it tends to assist change. So, Goodyear's multi-million-dollar processing equipment preserves and sets the 3-T Nylon Cords under heat. If then his what engineers term "a negative coefficient of expansion"—it tends to contract, or tighten up, when it encounters the heat and strain of tire service.

This makes 3-T Nylon ideal for high-speed, high-explosive airplane tires. It has the strength to fight back. It tends to control tire growth in service.

As a result of these qualities, obtained by the patented 3-T processing, Goodyear Aviation Tires—both tubeless and tube-type—have achieved a spectacular record of outstanding performance on today's high-speed aircraft.

Goodyear, Aviation Products Division,
Akron 16, Ohio, and Los Angeles 54, California



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another reason why **RYAN BUILDS BETTER**



HERE ARE 44 OF AVIATION'S MOST PRODUCTIVE ACRES

Ryan is a \$30 million facility, superbly equipped for its job of serving the aircraft and engine industries and the military services. With 550,000 square feet of factory floor space, Ryan manufacturing includes "big" jobs like the huge Boeing KC-135 mid and aft fuselage, and Douglas DC-9 jet cabin pods and wings. With the most modern measuring tools for forming, welding, machining and heat treating, Ryan manufactures the essential jet engine, aircraft-engine, rocket and missile components which require unique-like skills and intimate knowledge of high temperature alloys.

Ryan is 4750 people, headed by a management that has demonstrated experience and vigor in achieving top performance in quality, delivery and low cost. Ryan's financial stability and

sound growth are widely recognized. Ryan's skilled production people are specialists who draw upon a background that covers 20 years of the half-century of flight. There is no parallel to the Ryan combination of experience, facilities and proven performance in the field.

Ryan is a leader in research and development, which believes in "never letting itself caught alone." One out of every five employees in the engineering division, by enlightened attack upon aviation's complex problems, Ryan engineers are constantly advancing the state of the art. Significant milestones in this steady progress are Ryan's off-jet engine capsule, the world's first, the Firebee jet target drone and Ryan's unique electronic systems for astrodome, global navigation and for missile guidance.

With a background of 40 years of experience in vehicles, Ryan excels in designing and producing high quality aircraft, power plants and missiles, built at low cost, delivered on time.

Engineering facilities for a challenging future will find interesting opportunities at Ryan.

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Denville, New Jersey

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• Here was a city boy from Alexandria (Egypt) who was always pyramid-lengths ahead of his class when it came to things mechanical. Trudging around one day in the year 120 B.C., he came up with a gadget that would revolve indefinitely as long as he kept a brisk fire under it. Called the "Ankhophis," this device was a primitive reaction motor. But alas, Herod's engine ended up as a mere curiosity — for lack of an application.

Today, challenging new requirements are constantly creating the need for power sources which only rocket engines—modern reaction motors—can satisfy. RMI engineers have successfully harnessed this reaction principle for a wide variety of important aerospace propulsion requirements and are extending the application of rocket power to other equally important fields.

◀ Static testing a new RMI rocket engine of the most advanced design.

CONTOUR-WELD



CONTOUR-WELD PIPE... BEST BY ANY TEST YOU CAN NAME



new stainless pipe

with a weld so smooth you can't even feel it

Run your finger over the weld area inside Trent's new Contour-Welded™ pipe. We doubt if you can even feel the weld. It's that smooth! There's no weld bead... no undercut... no place for corrosion or erosion to get a start.

Here's the reason: Contour-Welding is an extremely different method of producing welded pipe and tubing. It puts gravity to work to pull down the raised weld-metal to conform with the exact contour of the pipe. That means a smooth, clean weld practically indistinguishable from the pipe itself.

Contour-Weld Means Trent's Better Than Ever

As always, this new TRENTWELD pipe and tubing is made from uniformly rolled stainless steel. Wall thickness is always the

same throughout the pipe... and Contour-Welding brings this same high uniformity to the weld area itself. All this, plus Trent's superior cold-working methods, gives you a stronger pipe or tube, with smoother flanged ends.

Try new TRENTWELD pipe or tubing on your next job. It's available in any gauge, for all applications including high-pressure hydraulic lines... high-velocity systems... lines carrying corrosive chemicals. And new Contour-Welded tubing is available in most grades, including Hastelloy, Zirconium, Titanium, and 19-9-6. You'll find that TRENTWELD can't be beat by any other pipe—welded or not.

Contour Weld is the trade name of the Trent Pipe Company for its process of welding pipe and tubing which is patented under U.S. Patent 2,718,476.

Why Trent's Exclusive Contour-Weld Process Means Smoother Welds...



Nowhere, in producing welded pipe, is the weld made at the top. But gravity plays a sure trick. It tags at the high areas in the weld areas, pulling it down toward the middle of the pipe. The result, predictably in the heavier gauge, is a possible bulge where it bows the most—right on the ED surface. If you try to get rid of the bulge—it's built out—the metal is undercut—and erosion and corrosion start there.



But, Trent put a stop to that—simply by going into partnership with gravity. With their exclusive Contour-Welding process, they weld at the bottom—and gravity works for them. For them, the bulge is in the opposite direction—blending in perfectly with the contour of the pipe itself.

TRENTWELD

STAINLESS STEEL TUBING

TRENT PIPE COMPANY, GENERAL TRADE OFFICES, EAST TRAY, WYOMING (Subsidiary of STAINLESS STEEL COMPANY OF AMERICA)

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A New Meaning for Dependability



Any pilot can get vertigo but the Lear ARCON™ can't.



West Magnetic Amplifier Voltage Requirements
now flying are Cline built.



Douglas C-118

Regardless of the place or the mission, rugged dependability means everything beyond the point of no return.

Cline Electric supplies new assurance of safe service! The Cline Regulated, wide-frequency-range (330-1000 cycles) Magnetic Amplifier Rectifier Voltage Regulator, with the USAF B-1 alternator, now in widespread use on the T-33, C-97, and C-118, has logged more hours of dependable flying time than any other military aircraft voltage regulator.

Cline Electric's Magnetic Speed-Potentiometer Drives have also proved their dependability in handling other complex electronic control problems.

Cline Electric means rugged, trouble-free dependability.

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**VARIABLE DISPLACEMENT
3000 PSI PUMPS**



only 7
malfunctions
in
3,028,064
pump
hours

During a 5½ year period (July 1, 1949 to December 31, 1954) the TWA Accessory Shop overhauled 3000 Vickers Variable Displacement Pumps used on the cabin supercharger driven in their 749 Constellations. Of these, there were only seven malfunctions . . . all others were routine overhauls. In other words, only one of every 408 pumps scheduled for overhaul was for a malfunction. For the last three years the scheduled overhaul period for these pumps has been 1700 airplane hours.

Such reliability is another one of the reasons why TWA and other great airlines are large users of Vickers hydraulic equipment. For further information, ask for Bulletin AS203-A.

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1944

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MINUTES INSTEAD OF HOURS



Balance out the continuing air cost of ground heating equipment with an astounding consumption of time and manpower against the question cost of the UAP COLD WEATHER OIL SYSTEM transformer.

The UAP COLD WEATHER OIL SYSTEM is designed to furnish fuel engine oil after cold-start at -65°F. without the application of external heat. This small oil supply is then utilized after engine heating to flush out the makeup oil in the tank outside of the sump. Oxidation of the oil (sludge) is minimized

by the system's deoxygenating feature.

The system is for retrofit on most of the dry sump engines in use at the present time and is everyday service on more than 300 single and multi-engine planes.

Used in conjunction with UAP COLD WEATHER OIL SYSTEMS at temperatures lower than -30°F. is the UAP HOT FUEL PRIME SYSTEM which insures safe, reliable engine starts in 3 minutes or less. Both systems remain installed but inoperative during warm weather flying.

For prompt quote on UAP COLD WEATHER OIL SYSTEMS and delivery factors on existing designs, please send detailed dimensional drawing of your oil tank to UAP Engineering, Dayton, Ohio. For descriptive literature covering both systems please contact one of the UAP Commercial Engineering offices listed:

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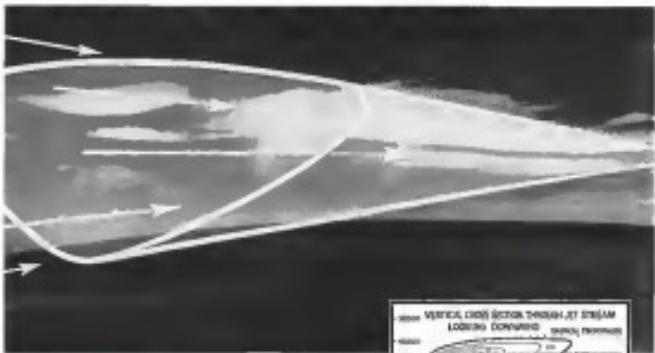
UNITED AIRCRAFT PRODUCTS, INC.

1116 BOLANDER AVENUE, DAYTON, OHIO

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FLY WEATHER-WISE

These weather items prepared in consultation with the United States Weather Bureau



JET AGE DEVELOPMENTS

JET FLIGHT — As jet flight becomes more commonplace, it is increasingly important to understand and minimize the problems and phenomena associated with high altitude, high-speed travel. Clear air turbulence, sudden wind and temperature changes, subicing, and some of the meteorological features are being explored.

JET STREAM — A recently discovered current of high-speed winds moves from the West across the middle latitudes of both hemispheres. Maximum wind velocities of over 200 knots are reached at altitudes of 35,000 to 40,000 ft., varying so much as 15 knots per 1,000 ft. up to the case. Cross-sectional view at upper right best shows the jet stream structure.

JET FUELS — To meet the varied demands of subsonic supersonic flights, jet fuel must do its best in existing aircraft. New manufacturing processes developed by Socony Mobil can produce jet fuels with improved thermal stability to meet these critical requirements.



*Best Pair
to Get You There!*

SOCONY MOBIL OIL COMPANY, INC. and affiliates
MOBILPAK PETROLEUM COMPANY, GENERAL PETROLEUM CORPORATION

B-52 + PHP* = -50 lbs.

*Parker Hydraulic Package

Aircraft manufacturers are constantly trying to upgrade their products. Their engineers are engaged in a never-ending search for better equipment. In this search weight is always an important factor. Every pound—every ounce—saved is a step forward.

Parker's latest contribution to this upgrading and weight reduction is a Hydraulic Components Package, ten of which will be used on the new B-52, with a savings of over 30 lbs. per plane. Each package contains two check valves, one degassing valve, one by-pass valve, one restrictor, one filter and other bypass.

In packaging these components in housings are eliminated, fewer hoses, fittings and mounting provisions are used, maintenance is greatly reduced, installation costs are cut, valuable space is saved; greater safety is achieved in fewer joints means less potential leaks and weight is greatly reduced.

Similar packages are being designed by Parker for other installations.



Clear air turbulence is induced by the difference in air band edge and top of jet stream. Rapid changes in temperature (10°F or more) in 1° bands occur on either side.



First landing of subsonic aircraft to go into commercial service in U.S.A. is being handled by known Model. The customer is Trans-Canada Air Lines' Victoria Fleet.



Let a Parker Team help you

A Parker Team is available to assist you in designing a Hydraulic Components Package to meet your specific requirements for existing or proposed models. If you have any problem in hydraulic, fuel or check valves or are beginning system design get a Parker Team on your staff.



Anti-servo Anti-dive Fuel valve Check valve



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Hydraulic and fluid
system components

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Announcing one of the
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AVIATION WEEK ever made
available to aviation advertisers
... the 23rd Annual Inventory
of Airpower Edition,
MARCH 12, 1956.

Airpower in the Atomic Deadlock

"Airpower in the Atomic Deadlock" will feature a full-scale editorial roundup on the major phases of world airpower. Special editions, features and expanded technical departments will focus on the gigantic task of keeping our airpower prepared to meet any new threat to the free world. In the tradition of past inventory issues, no effort will be spared to make "Airpower in the Atomic Deadlock" the industry's most useful reference edition.

Research for special reports has been under way for the past six months. The latest information on foreign airfields is pouring in through AVIATION WEEK's worldwide network. AVIATION WEEK editors are traveling on a team basis throughout the industry seeking out the type of material that will make the edition a top issue of 1956. Volumes of

aviation statistics are being packed into detailed specification tables covering all U.S. and foreign aircraft, helicopters, engines and missiles.

Year-round readership, usefulness and references value make the 23rd Annual "Inventory of Airpower" Edition an extra dividend issue for aviation advertisers. Your selling message in this extremely significant issue will reach more than 75,000 of aviation's most important men ... 55,000-plus subscribers plus some 22,000 purchasing readers! ... key engineers and management men in manufacturing and transportation, in service and procurement codes - military and governmental leaders. A receptive, influential, enthusiastic audience for advertising to begin with, these top aviation people will see AVIATION WEEK's 23rd Annual "Inventory of Airpower"

as a crucial reference. Here is lasting reader interest that assures your advertising a long and effective selling life. "Airpower in the Atomic Deadlock" offers an unmatched advertising opportunity in all companies who sell to the aviation industry. Write or wire — make your advertising reservation today to insure special attention for your selling message. Place your advertising directly or contact your nearest AVIATION WEEK representative.

AVIATION WEEK version 20 and 200 editions, base - December 1952: 21,000 Paid circulation of current issue: more than 54,000 Avco readership reported by Advertisers. Readers' Perpetuation shows 14,000 for every subscriber copy of AVIATION WEEK; readership determined by personal interview using strict recognition test. Current print order exceeds 40,000 copies.

AVIATION WEEK

A McGRAW-HILL PUBLICATION

330 West 42nd St., New York 20, N. Y.



46-1000



ABOVE: The fast Beechcraft Model 75 Jet Mentor



RIGHT: The Beechcraft T-34 Mentor

Sisters Under the Skin

The new Beechcraft Model 75 Jet Mentor is based on the tried and proven Beechcraft T-34, now serving the U.S. Air Force, U.S. Navy and five foreign nations. Both planes use many of the same component parts, and feature maximum performance, ease of operation and maintenance and outstanding economy. Both have been developed by Beech Aircraft in private ventures ready for military service throughout the world as "off-the-shelf" trainers.

Students could easily start right off in the Jet Mentor without previous flight instruction. On the other hand, the T-34 and Model 75 are so similar that very

little transition would be required to convert from one plane to the other.

The new Beechcraft Jet Mentor represents a significant step forward in jet design simplicity. *It is heavy enough to take it, light enough to be the world's most economical jet trainer.*

PERFORMANCE AND SPECIFICATION DATA

(Engines: Continental J69-T-9 Turboshaft)	
Cruising Speed	345 mph
High Speed (at 13,000 feet)	385 mph
Divining Speed	500 mph
Service Ceiling	28,000 feet
Range (maximum with reserves)	410 miles
Gross Weight	4,235 pounds
Empty Weight	2,935 pounds
Useful Load	1,290 pounds
Lift Factor (maximum)	11.35 G's
Rate of Climb	1,400 fpm

Beechcraft

Beech Aircraft Corporation, Wichita, Kansas, U.S.A.

BEECH AIRCRAFT T-34 Trainers for the USAF and USAF: L-33 Transports for the U.S. Army, Jet Trainer: #6-3 Mobile Gunships; Super STB Executive Transport; Model 930 Twin-Beech; Model 935 Beechstar.

EDITORIAL

Confusion on the Missile Program

"Added to the increasing strength (Strategic Air Command) each month is our growing stockpile of intercontinental ballistic missiles which represents the most modern and devastating weapon of war in existence today."

This statement last week by Sen. Everett Dirksen (R-Illinoian), a former chairman of the Senate Armed Services Committee and now ranking minority member of that committee, is indicative of how little accurate information is being dispensed to the public these days on the state of this country's guided missile program. Everyone who has even the remotest connection with the missile program knows that the United States has no stockpile of intercontinental ballistic missiles, that it has none in operational service, that the first ICBM development program (Cassius) is still in the prototype construction stage and that the second ICBM program (Marshall) was just begun a few months ago.

When quoted on the Dirksen's statement an Air Force spokesman replied (as reported on p. 25) that the only ICBM stockpile he knew of must be right in the Senator's office. When Aviation Week checked Senator Dirksen's office, we were told that the Senator's statement was correct but no further details could be given because of "Military security."

Russian Missile

What is even more about Sen. Dirksen's statement is that it was made at least four months after the existence of a Russian 900-mile ballistic missile was accepted as a fact by all of the top-level defense and policy groups of the Eisenhower Administration.

Existence of this missile is such a well-known fact in Washington that President Eisenhower confirmed the Russian lead in this field at his most recent press conference, although he did not specifically identify the Soviet missile as its range.

The President and that while the Russians may lead in some fields of missile development, the U.S. leads in others. This is perfectly true. But the President did not specify that the Russians had the lead in long-range ballistic missiles, while our lead is in defensive short-range missiles such as the Thor, Falcon, antiballistic missile and the Convair Tandem and Bantis. Thus surface-to-air missiles.

Symington Positive

Sen. Stuart Symington (D-Mo.) has stated flatly (see p. 27) that the Russians have test-fired a ballistic missile many hundreds of miles farther than we have. Sen.

Henry Jackson (D-Wash.), who holds posts on both the Armed Services Committee and the Joint Congressional Atomic Energy Committee, has warned that the Russians may beat us to the punch with a 1,500-mile intercontinental-range missile.

The President has told the public that everything possible is being done to research and develop the missile programs in this country "so far as my experts and my people in the Defense Department tell me."

This was in the same week that the top missile expert in the Pentagon, USAF Assistant Secretary Trevor Gardner, resigned in protest over the poor and scope of the entire aerospace and missile development programs and specifically charged that the missile program was not being pushed as hard as possible.

This sequence of events leaves the public wondering just who are the "experts" in the Defense Department on whom the President depends for his information. It also leaves a strong implication that the information he is getting is not as complete or accurate as it should be.

Congress Must Probe

In this welter of conflicting statements it is virtually impossible for the taxpayer citizen or the legislator who represents him in Congress to discern the truth about the relative status of the Russian and U.S. missile programs.

In the face of this mass of confusion on the missile picture Congress over the objection of that country's full and searching inquiry into the true state of our national program in this vital field.

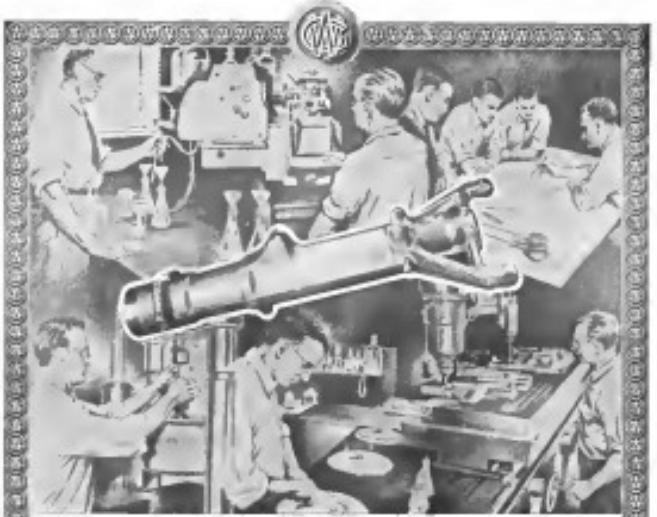
This inquiry should be conducted above the level of partisan politics and it must not be hamstrung by plenary clauses of military security that are designed solely to conceal the truth.

HELP Curtis

President Eisenhower has made an excellent choice in the appointment of Edward P. Curtis to make a long range study of civil aviation development problems and requirements. Mr. Curtis has a long and distinguished record in aviation that began as a fighter pilot in World War I, flying Spads and Nieuports in combat over France. His aviation knowledge has been tempered by years of business experience with the Eastman Kodak Co., of which he is now a vice president.

The President is taking vigorous action to insure the proper growth of civil aviation as an integral part of our national fabric. Everybody in the aviation industry should give Mr. Curtis all the assistance and support he needs to do his job effectively.

-Robert Hots



FORGING TECHNICIANS—Yes, that is the compliment paid us by those acquainted with our services. In back of each design is a thorough understanding of engineering and metallurgical needs before production begins . . . assuring forgings of maximum physical properties and uniform quality.

THE LANDING GEAR FORGING illustrated, nearly five feet long, is an important component for a modern military fighter . . . another example of Wyman-Gordon's technical contributions to aircraft.

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WHO'S WHERE

In the Front Office

Edward A. Frost, board chairman, Solar Aircraft Co., San Diego, Calif., formerly president of the firm. **Herbert Kressel**, president, formerly manager, San Diego plant. **Frederick A. Schaeffer**, purchasing agent.

Harold E. Johnson, vice president, manufacturing. **Tobin Dwyer**, Douglas Aircraft Co., Inc., managing director. **Baldwin**, assigned to take a general assignment at Douglas Santa Monica.

George Franklin, Jr., division of advanced planning and development, Douglas Aircraft and their division, Link Aviation, Farmingdale, N. Y., formerly vice president, manufacturing. **Wilhelm W. Wood**, formerly regulating air speed, president, in charge of Fiedel's former plant. **John M. West**, manager of the engineering division. **Maxwell H. Smith**, formerly manager of research and development division.

John W. Marr, board chairman, Pacific Telephone Cos., Los Angeles, Calif., formerly Thomas White, resigned.

Joseph C. Rausch, formerly president, now manager of the New York Division, Service Merchandise Corp., Greenwich, Conn.

J. Lawrence Reynolds, vice president, fuel economy, GM's Control Services Div. (Lithonia). **Jack C. Beaudette**, consulting engineer, development of the GM 3000 Diesel. **James C. Conroy**, formerly chief engineer, electronic development division, and Alfred Krueger, procurement engineer.

Robert A. Viggiani, executive vice president, Robert McWilliams Corp., Louisville, Ky. **Robert H. Gibbs**, recently elected president of McWilliams.

Houses and Elections

E. H. Light, assistant director, engineering, Chesapeake Spark Plug Co., now chairman of the Board of Directors of the Chesapeake & Ohio Canal Navigation Co., successor to the National Engineers.

Carl A. Agar, Oklahoma Helicopters, Van Zandt, W. C., a president of Oklahoma Association of America. **Don Larson**, Illinois Pub. Power Dist., Vinton, Wash., H.A. **John C. McRae**, formerly chief of the Bell Telephone Co., Atlanta, Georgia.

William A. M. Baskins, life trustee, Columbia University.

Changes

Edgar A. Frost, manager, Radio Systems Laboratory, Standard Research Institute. **Major Gen. Louis Woods**, USAF, an member of public relations staff, Kaiser Research Group, with headquarters in Washington, D. C.

Robert M. Coates, assistant chief designer for fire control instruments of Curtiss-Wright Industries, Inc., Menasha, N. J.

Ray Lee, Jr., in charge of engineering data department, Gorham Enterprise, New Haven, Conn.

Robert A. Gaffney, head of research and development, Electronics Division, Thompson Products, Inc., Cleveland, Ohio.

INDUSTRY OBSERVER

Bell Laboratories has a new \$12 million Ames contract to develop a delta type missile against the intercontinental ballistic missile. Bell also has a study contract for the same type missile from the Air Force.

Hughes Aircraft Co., which developed the Falcon sky to air missile, is developing the fire control system for Douglas Aircraft's Dog Dong short-range missile equipped with a nuclear warhead (AW Feb. 6, p. 23).

Nose cone nose cone studies development for intermediate and long-range ballistic missiles will be blunt rather than pointed to help in alleviating some of the thermal problems associated with the heat shield insulation required when descending to the target. This will involve an optimum compromise between high heat fractions involving high loss of the heat shield shape and the high wave drag to obtain reduced performance of the blunt shape.

Martin Matador missile has a new packaging and logistics system that uses fastened doors and ease packing case to deliver a complete missile to a field unit. The new pack system replaces seven wooden crates used earlier in the TM-48 program.

Radioplane's new supersonic grafted missile boom the designation XIN-34S.

North American Aviation's new high altitude, rocket-powered research plane has been designated X-15.

Westinghouse has two new jet engines under development for the next ten years with the designations XJ14 and XJ54. These are in addition to the XJ79, 6,500 lb. thrust jets being tested by the Navy.

Anderson, Greenwood & Co. of Houston, Tex., is developing two high-speed targets for the Navy. One is a flexible type and the other solid. Both will have a top speed of Mach 8.5.

Boring Aerophysics Co. is scheduled to deploy a full scale interior mock-up of the B-70 jet transport in New York beginning early next month. Five aircraft will be featured with Boeing-designed chairs of unusual man-in-the-loop design.

Watch for Convair to establish a separate guided missiles division to handle both Navy and Air Force missile programs. Convair now builds the Tenter missile missile at a Pease, Calif., plant and is developing the Atlas intercontinental missile (SM-65) at its San Diego plant.

A. P. Giannini, senior of the Lockheed C-130 in under development and in production, is leaving the Martin Co., Denver. Previous aircraft he intended to leave to assist in the design of the new aircraft. That such design was the Standard development of the C-130.

Watch for KLM, the Dutch airline, to make key decision soon on the preference developing transport fleet. Competition is between the Lockheed Electra and Viscount Viscount.

Nos gray paint that has become standard on USAF and Navy fighters along with radomes or missiles is a protective coating to prevent aircraft skin against corrosive effects of hot rocket and missile gases.

Negotiations with India for production there of the light-weight Folland Gnat are nearing completion. An Indian version is due in England this spring to sign final agreements with Folland and British Aerospace Co. for the cockpit-free aircraft. The order will be for about 60 planes. Folland will build about 25% of the order with the remainder built in India.

Hawker Siddeley has again been modified to eliminate difficulties encountered while flying their jets at altitude. First of the modified Hawker are due back in service before summer.

Washington Roundup

ICBM Stackpile?

Defending the Administration's air power program against Democratic attacks, Sen. Everett Dirksen (R., Ill.) pointed to "our stackpile of intercontinental ballistic missiles" as one of the measures of our military strength. He is making Republican and former elements of the Senate Armed Services Committee.

Asked where USAF is keeping its module of ICBMs, a weary Pentagon officer said: "Right in Mr. Schlesinger's office. It's the only one I know of."

This is Schlesinger's report:

"The Air Force program to modify 177 wings at the end of the fiscal year is a little ahead of schedule, and we will have 131 wings at the end of the present fiscal year. All additional bomber wings of the Strategic Air Command are now equipped with the jet B-52's. There B-52's, together with a very large fleet of KC-135 tankers and extensive overseas base morale counts, have principal strike striking force. Added to this mission through each month is a stackpile of more conventional ballistic missiles which represent the most modern and the most devastating weapon of war in existence today."

"I had occasion just last week to discuss this program with members of the Air Force Quality, one of Air Force's leading research and development scientists. He gave me his personal assurance that the intercontinental ballistic missile program was receiving high-priority attention. Our focus solar system is being rapidly delivered for our troops, providing an attack in less than three minutes, thus reducing equipment and their ability to retaliate promptly with devastating effect."

Engine Profits

Home Armed Services investigating Subcommittee has not yet decided whether to hold public hearings or probe of aircraft engine manufacturers, aerospace manufacturers, and large military aviation subcontractors, after it completes its hearings on the 15 major defense companies.

Basic information on these three categories—as well as the 13 prime contractors—was gathered by the sub during the Congressional session from August through December.

Rep. Edward Hebert (D-La.), chairman of the subcommittee, said that the only definite decision on public hearings was to route the 15 defense companies.

Snark to Appear

Watch for a national picture program to point a movie star contrasting photos of the Arms Race and USAF Bank. The pictures are officially released but Defense Department had refused to release them to other newspapers or magazines. In this case, the name of appraiser has given as top Defense casting, where Assistant Secretary Robert T. McRae caused the bid for the publication after standing firmly against release of the same unclassified material to the rest of the press. A committee of top service leaders finally was held to determine what would be the best way to make the movie appearance at White House reception when the article appears. Regular military officers in the Defense Department's Security Review Office were kept out of the proceedings, exercised no authority over the situation.

Bigger pile to many of them is that one of the Senate committees subverted at a party of a photomontage on a wall at the office of a club at Party AF.

USAF Speech Policy

Wide and obvious gap between statements of Air Force Secretary Donald Quarles and top USAF generals on relative strength of Soviet Union in technological and strategic areas has never been wider. That Chief of Staff Gen. Nathan F. Twining and his vice chief, Gen. Thomas D. White, had been ordered to stop making speeches and statements. The truth is less certain and much broader. USAF's Office of Information Services, headed by Brig. Gen. Robert L. Scott, Jr., has been told it will be held strictly responsible for the content of all USAF speeches.

Airmail Postage Increase

Pastor General Arthur Shewmaker has received his dues for postage increases—increasing as second class rates rise to seven cents as often. But, as in the past several years, it has not won full opposition in the Congress.

Shortly after Shewmaker made his request for postage increase, Rep. Fred Hildebrandt (D-Minn.) announced the Department's deficit was \$400,000 a minute. Sen. Otto Johnson (D-S.C.), chairman of the Senate Post Office Committee, announced an extensive investigation to find other ways to save Post Office costs. Johnson declared that "every effort should be made to reduce the deficit through maximum economy," before postage is increased.

Cold War Buildup

Defense Department has issued a new Postage "Fact Sheet" disclosing that the building's defense population now is 25,000. Recruiting peak during World War II was 25,500 in April, 1945. Former Air Force Secretary Stuart Symington, now a Senate voter, points out that the number of 2,500 includes a big jump in the number of Secretaries—from eight to 31.

Airport Politicking

The announcement of \$15 million in new airport projects brought charges of Republican politicking against Secretary of Commerce Charles W. Eames and Under Secretary for Transportation Louis Rothchild.

Rep. Peter Frelinghuysen (D-Ga.) preferred that advance of the project were disseminated by Republicans' National Committee to local Republicans so that could make for obtaining them.

Senators Woods and Rothchild have already disavowed their political concept for members of Congress at the majority party by their campaign to allow funds for a program that Administration undersecretary to defend. "Frelinghuysen," "In other words, they don't particularly like us willing to adopt the budget," he said.

The bill is not likely to end here. Preston is chairman of the Appropriations Subcommittee which handles funds for airport projects.

—Washington staff



FLIGHT DATA IS TELEMETRED from test aircraft like this modified RF-101, to receiving equipment in the G-E Flight Test Center. Electronic reading records display the test data, allowing instantaneous engineering evaluation.

How telemetered flight test data speeds development of G-E flight control systems

By allowing engineers on the ground to evaluate test data while flight tests are in progress, a telemetering system is speeding the development of General Electric flight control systems. Any requests in flight adjustments to equipment or changes in flight test plans are radioed directly to the test pilot. This ability to refine the tests as they are in progress greatly increases the amount of pertinent data that is collected per flight.

General Electric has extensive experience in designing, developing, and manufacturing many types of flight control systems. Valuable experience has also been gained with respect to flight control systems for bombing, approach, and fair control systems. All this experience is being put to use in building flight control systems for the latest supersonic aircraft.



FLIGHT TESTING is performed at the General Electric owned and operated Flight Test Center at Schenectady, N. Y.

Progress Is Our Most Important Product

GENERAL ELECTRIC

FOR DETAILED INFORMATION on G-E flight control systems, contact your General Electric Aviation and Defense Industries Sales Office, Schenectady 221-4, Schenectady 3, New York.

Ramo-Wooldridge, ARDC Groups Act as Missile System Managers

Los Angeles-Western Development Division of the Air Research and Development Command, the Special Aircraft Project Office of Air Materiel Command and the Guided Missile Division of Ramo-Wooldridge Corp. act as contractors here to function as weapon system managers for the Air Force guided missile program.

Western Development Division is composed of about 100 USAF officers commanded by Maj. B. A. Schmitz. All but four or five of these USAF officers hold engineering degrees with a high percentage of aeronautics degrees and a few PhDs. They wear civilian clothes and uniforms that make them look like the Ramo-Wooldridge Corp. Guided Missile Division near Los Angeles International Airport.

Although Western Development Division is part of ARDC, it has its own board to operate independently on strategic missile programs set within its boundaries and does not require ARDC approval for its actions.

Special Aircraft Project Office holds a similar position within Air Materiel Command. It too can sign its own contracts where official Government can't do so. It does not need AMC approval for its actions and it has authority to sign contracts with contractors for whatever hardware it considers necessary for the missile projects under Western Development Division jurisdiction.

Scientists Available

Ramo-Wooldridge Corp. Guided Missile Division provides a staff of mathematicians and scientists who are available to missile contractors for guidance and assistance in development of specific missile programs. Western Development Division's function is not that the Ramo-Wooldridge Corp.'s capabilities can't be applied simultaneously when contractors are working on other new fields and do not have their own staff or facilities to cope with new types of problems.

Ramo-Wooldridge Corp.'s position in Western Development Division and the USAF missile program has been a source of friction with aircraft and missile missile contractors. The aircraft firms have been reluctant to divulge their technical data to Ramo-Wooldridge personnel on the grounds that the corporation is also a competitor in the missile and aircraft fields.

Some major missile contractors feel

ARDC is putting them at a competitive disadvantage in forcing them to give up technical data to another firm that

is also managing the same type of equipment.

These three units—Western Development Division, Special Aircraft Project Office and Ramo-Wooldridge's guided missile division—operate as a unified command, with WDD operating at contractor system manager, SAPO handling the contracts and Ramo-Wooldridge furnishing technical assistance and evolution where needed.

Six-to-One Ratio

Within Western Development there is a ratio of about 10 technical people to one administrative officer. Among the technical people are specialists in weapons systems development, operational analysis, test planning, operational trials and planning.

When Western Development Division was organized, ARDC looked around for an organization that had the

scientific and technical staff as supplement to the military experience of the aerospace group. ARDC conducted a search of potential suppliers of this type of talent and picked Ramo-Wooldridge's Guided Missile Division.

Overall, the role of WD, SAPO and Ramo-Wooldridge act as weapon system contractors to USAF headquarters. USAF tells them what it wants in the way of operational missiles. Western Development Division decides what form the weapon development will take. SAPO lets contractors for development of the aerospace hardware and Ramo-Wooldridge uses technical evaluation of contractor proposals, provides technical assistance and helps get rejections. This arrangement has proved from Western Development Division's original direction of missile design, hardware and ARDC contracts in the West Coast.

In far more strict contract control,

the Convair Atlas intercontinental ballistic missile program and was later extended to include the intermediate range ballistic missile.

Ramo-Wooldridge Plans New Plant To Step Up Avionic Production

Los Angeles—is a move to establish itself as a major producer of avionic equipment. Ramo-Wooldridge Corp. has announced plans for the construction of a full-scale manufacturing plant near Leimert Park, south of El Segundo. The plant will be located on a 54-acre site on which the company already has taken option [AW Jan. 16, p. 157].

The new Ramo-Wooldridge research and development facility will manufacture the equipment in all full production capability. Its present facilities are engaged mainly in pilot-line production of avionic components.

Capacity is 172,000 sq. ft. It is assumed, however, building will be broken this spring. It probably will require another year and a half for the structure to be completed, tested up and ready for production.

The plant is laid out to expand in three directions, and the new building will occupy only a small portion of the 600 acres. There are no present plans, however, for additional buildings.

No specific analysis has been planned for construction of the new facility, but original production generally will be missile systems for the military, including aircraft fire control systems, nuclear weapon electronic computers and advanced environmental equipment.

Another reason for selection of the Denver site is that there are skilled and talents available there for the type of manufacturing the company will do.



RESULTS, second in lightweight launcher, is moved up to status outfit for test firing from deck of the USS Roosevelt.

New Launcher Weds Regulus, Catapult

The manufacturer and subcontractor of the Convair Vought Regulus Navy's first supersonic missile, has developed a launcher that has replaced in the development flight a lightweight launcher-dolly that provided expert launching and down range with the conditions equipment previously required.

The three-wheeled launcher, fabricated from steel tubing and sheet metal plates, shear and right driving tools aboard the USS Roosevelt, weight just over 2000 lb. or much as the portable launching platform and fuel bottles required for earlier carrier launches.

The launcher can be loaded aboard the carrier fighter plane and secured on the carrier's longer deck. When ready for use, the dolly is wheeled to the carrier deck and hoisted up to the driver's cockpit ready for launching. At the end of the catapult run the Regulus takes to the air and the launcher is pivoted onto the sea. Design change as the east war began in China Vought last spring.

The design of the Regulus dolly was first conceived by Convair Vought in 1947, and two versions eventually evolved—a reversible test and training model with a retractable landing gear and a nonreversible type of model.

It has been launched successfully from the decks of carriers, carriers and small surface ships, from deck launches and from submersibles.



WITH STREAM taking up from the baffle capsule, Regulus and launcher begin their rise.



NEARING END OF RUN, catapult projects to launch Regulus and guess launcher into the



Vought's Team: The Old Meets the New

Charles Voughn's new F/A-18 Hornet, foreground, shown, which promises to become the Navy's standard fighter, flies in formation with the older F/A-18C Corsair. The 5,000 mph per second Corsair is in its last form at the Vought plant in Dallas and is scheduled to reach the fleet in an operational form sometime next year. The Corsair entered the fleet late last year after a long series of delays. At right, the F/A-18 in background is favored to become its landing gear to hold the formation. The Corsair is powered by a Pratt & Whitney JTFP-4 turbojet engine with afterburner. The tail has by two Wright-Jenssen J46-WK8 turboprops.

IBM Radar Bombing System for B-52s

The IBM Corp.'s newest radar bombing and navigation system (the MA-2) first test on the Boeing B-52 was partially successful but work by International Business Machines Corp., producer of the system.

The system weighs 1,477 lbs., spans 90 cu. ft., and will cost approximately \$600,000 (excluding satellite link costs) when it reaches the full-production stage.

The MA-2, called BRAHES (Bombing Radar Navigation Equipment), is said to have "superiorized" reliability.

The contract for the system was awarded to IBM in 1961, about the time that the Air Force was experiencing considerable reliability problems with the Khouran system used in the B-52 and B-57. This difficulty explains



the emphasis on reliability in the MA-2 design.

The system employs a homing radar system, developed and produced by Raytheon Manufacturing Co., together with an optical homing.

The bombing navigation computer employed by IBM is basically an magnetooptic device, although the system does employ "some digital pulse counting techniques," a company spokesman said.

In answer to an Aviation Week question on IBM's application and the system at the present time does not appear to exceed production techniques now.

The MA-2 joins IBM's test entry into the field of complex airborne guidance systems, although the firm is a major supplier of digital computers for use in the air defense SAGE system.

The MA-2 bombing-navigation system is based on an ongoing Air Force-sponsored study contract with the Princeton Electron Co.

Douglas Announces Larger DC-8 Version

Douglas Aircraft Co. last week announced details of a longer, longer-range version of its DC-8 jet transport, one of which possibly will be provided by Pan American Airways Co., together with an upgrading.

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The Douglas and airline conference can choose their powerplants from among Pratt & Whitney's JT3 and JT3 and the Convair CV-103.

Strongest Statement Yet:

White Warns of Red R&D, Production

Chairman-Secretary Robert not only is asking scientific and technological advances at a "faster rate" than the United States, she also is "building up more and more productive methods," Gen. Thomas D. White, U.S. Air Force Vice Chief of Staff, said at the opening of General Electric Co.'s new jet engine facilities here.

Gen. White's speech on the shop's opening visiting Air Force called a military or defense leader on Russia's progress in the race for nuclear weapons. It came only a few days after USAF Secretary Donald Quarles spoke in Texas announcing the importance of technological development.

Gen. White said the Russians have:

- **Held on lead-time on the heavy bombers.**
 - **Developed a "lead-time considerably less than ours" in other aircraft.**
 - **Produced a strategic aircraft on a much larger scale, indicating a tremendous capacity for research and development.**
- To help meet the challenge, America must recruit volunteers to do more research and development on its own, Gen. White said.

"Almost closed the manpower gap" with "more than remarkable" progress in four areas where they once were at a disadvantage—the Soviet was strong economy right after World War II, then production base, then technology and the masses readily available in Russia.

Desire A-Dollar

It is useless to debate whether it is just that productive engineering is as sophisticated in ours, Gen. White said. "The fact is that they have been better protected mostly in a battle over funds for strategic research. Genius itself made it clear that he had sought funds for research in a wide variety of fields related to aerial weapon systems."

Gen. White noted specific areas in which we lagged to the later countries actually in the Soviet areas:

- **"They now have a sweeping lead at least, the flavor. In many respects it equals our new B-52, which is the best that American technology has yet been able to produce."**
- **"They have a long-range bombing heavier, the B-52. The B-52 is their longest-range airplane, comparable to our B-52. The B-52 is gradually moving into existence."**
- **"The Soviets also have a medium jet fighter very similar to our F-105. We still have a big lead on them in combat effectiveness."**

"The taxpayer and the legislature quite naturally prefer to see our national strength kept up to par, not inferior," he said. "The reader the research and development dollar kind of gets."

The statement came shortly after Trevor Gardner, Assistant Secretary of the Air Force for Research and De-



GEN. THOMAS D. WHITE

velopment, announced at the chance to be instrumental for more research and development funds (AW Feb. 13, p. 28).

Gordon's Fight Recalled

Although Gardner fight with USAF Secretary Quarles and Defense Secretary Charles E. Wilson has been interpreted mostly in a battle over funds for strategic research, Genius himself made it clear that he had sought funds for research in a wide variety of fields related to aerial weapon systems.

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"The statement came shortly after Trevor Gardner, Assistant Secretary of the Air Force for Research and De-

velopment," he said. "I refer to one talent for production—missiles production. When challenged to agree, we have always depended upon our own production methods to build and sell."

"This is the one of deep concern—the Soviets are presently buying an entire new generation."

"Of course we can outproduce the Communists," Gen. White said. "There is no doubt about that. Our production potential is set the season we're filling ahead."

Rousseau for Log

One of the reasons that we are dropping behind is that the Communists are making scientific and technological advances at a faster rate than we are."

The fact that Russia has put out one hot air program, we can easily indicate a tremendous capacity for research and development," Gen. White said, but it also "indicates a changed front and far more factors and a willingness to gamble."

The Russians "achieved these gains in weapons by excelling the non-use of a refined dictatorship," Gen. White said—describing "bright young Soviets" who scientific and technical teams "by choice of their own" making them build "bombs instead of automobiles, submarines instead of commercial vehicles, bombers of the sort of wingspan and range instead of aircraft."

Russia's war and domestic affecting much attention and productive of anything to make us ready for dictatorship," he said. "By another, whether, we can and plan the Soviet government controls everything right down to the last nut and bolt."

Aviation's Best Interest

To win the competition with the Soviet system, Gen. White said, "we must realize that the defense of the nation is everybody's business—not just ours, ours government." That is both the price and the privilege of democracy.

"The products of American capitalism—our great corporations—must accept along with them competitive function of action, their claim of our national responsibility to provide a safe society."

For our level numbers of aircraft and weapons "are necessarily decided by our policies and military leaders," Gen. White said, "and we could expect our private industry to meet the initiative in production."

Instead, he said, "our great corpora-

tions can best voluntary increase efforts to the sum of research and development."

In addition to the fact that "the research and development dollar [is] hard to get," Gen. White listed these reasons why industry must devote ever increasing efforts to research:

- Research, especially basic research, is becoming increasingly concentrated outside the government in the interests of corporate freedom. Governmental programs are amenable to too many people to be able to operate in a completely free environment."
- "If our Government paid for, and therefore controlled, all the research accounts to keep us afloat, there would be little difference between our Government and that of the Soviet Union. Private initiative would become stifled, if not banished."

This, he said, leaves huge responsibility with three alternatives:

- "They can do back and work for Government research and development money to the best they say. This would eventually show the Communists that we get as far ahead of us that our nation would live its freedom of action."
- "Our Government, in desperation

and management, could step in and control the research and development and all the other activities of our industries. That, of course, would be similar to the way we are living our life we are trying to defend against."

• "One industry can call up their clients and pitch in over harder to sell to governmental sponsored efforts to keep ahead technologically. Only in this way can we keep the U.S. ahead in the world's race to prevent us from being overtaken."

"This leaves little choice," says White, and, "not trading colonies" excepting the final alternative.

Even so, he said, "In no case, private sponsored research and development is free from friction yet." So, White continues, Gen. White said as "nothing more in the right direction" than General Electric.

He said the "evidence of scientific ingenuity and progress" on GE's new jet engine freely led the research of all other companies to "the results of protection and good business."

"It is good business to survive," Gen. White said, "and I am convinced that our survival depends on our technological progress."

Renegotiation Denies Net Worth

Washington—The Renegotiation Board has denied that return on net worth is a compelling factor in its decision to renew defense industries to make schools on Government contracts.

Although the announcement did not answer the specific industry in Boeing Aerospace Co., it was clear that clearly a reply to Boeing's contention that the Board placed too much emphasis on net worth (AVN Jan 23, p. 15) Boeing has appealed a Board determination that it must extend \$30,000,340 as compensation for 1952 savings.

The Board decided it "does not regard any particular size of return on net worth or capital employed in excess of per cent."

It said it "does not attempt to equalize its determinations respecting the amount of gross industry from the standpoint of return on net worth or capital employed, reasonably as an recognition obviously is not a determining process."

The Board does not place special emphasis on the net worth and capital employed factor as distinguished from the other statutory factors.¹²

Boeing's Case

In the Boeing case, a company spokesman declared that return on net worth "was the controlling factor" in that case. He argued that it did not "create unreasonableness of the price"

and management could step in and control the research and development and all the other activities of our industries. That, of course, would be similar to the way we are living our life we are trying to defend against."

In such a case there will often be a significant increase in contractor's rate of return on net worth over the no-schedule preceding years which probably would be in a economic effect to increased volume and increased Government contracts.

"Orthodoxly the Board must consider the fact together with all other relevant factors, as deteriorating whether contractor's profit on the expanded responsibility also bears a reasonable relationship to the expanded volume."

SAC Still Reds' Major Deterrent, LeMay Says

Washington—The fact that the Government has broken the American monopoly on strategic bombers, nuclear weapons does not detract from the deterrent value of our own Strategic Air Command, in the opinion of its chief, USAF Gen. Curtis F. LeMay.

Gen. LeMay told a Washington audience that he does not expect us to attack the United States so long as his command can provide deterrent to the enemy.

"As long as a potential aggressor is convinced of that," he said, "I do not think we have to worry about a war. Our main job is to keep him convinced."

The Strategic Air Command commander made these claims for the first time.

• "They can find their targets with certainty. By celestial navigation, they can fly to within 15 miles of our spot on earth and from there find their precise target by radar."

• They can destroy a specific target. On practice missions the targets in not always a city but often a specific corner of a building.

• They can get home from the target with only at least as good as in World War II, when the losses were less than 2%.

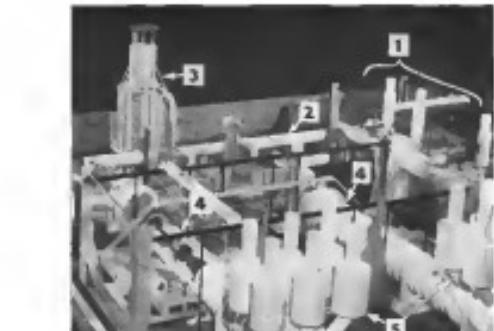
If SAC's deterrent power fails to convince an aggressor, Gen. LeMay declared, an engine and aircraft crossbow-punch by his command would knock out the last target.

This would include laser bombs and fighters, weapons stabilizers, fuel capsules and possibly laser culture self-destruct systems.

These are the policy to give maximum deterrence to maximize the chances who utilize their own financing, because when capital is supplied by the customer, the contractor's cost/benefit tools to be that of management only.

Assisted Returns

As example of this, the Board said "it is based on a case where an increase in Government-financed facilities



GUTAWAY model of General Electric's proposed atomic energy test facility shows (1) air supply precooling, (2) air baffle, (3) air baffle, (4) test section and (5) test section exhaust duct. The model will be completed next year.

GE's Aircraft Turbine Division To Install Mach 3.5 Wind Tunnel

Connecticut—General Electric's Aircraft Gas Turbine Division has announced plans to add a \$20 million engine wind tunnel to facilities already valued at \$100 million.

The family will test engines three times more powerful than the present 10,000-15,000 lb thrust level of inlet conditions of Mach 3.5 and 60,000 R.P.M. Construction is expected to begin early this spring and completion is scheduled for 1958.

Aisle floor of the test area, General Electric feels the need will

- Permit advanced engine's altitude performance guarantees
- Check the aerothermal strength of various engine components during altitude operation.

Flow Simulation

The wind tunnel will be made up of an 80,000 liter/min compressor driving section, an air preheater (or cooler) and two stator sections, each followed by exhaust sleeves. The engine test sections will be slanted cells, 11 ft in diameter. These will simulate the altitude pressures along the engine but not the flow.

The flow will be simulated at the engine inlet by a much smaller downstream nozzle, which will direct the supersonic flow to the engine's inlet. On some instances the upstream flow can be diverted or sprayed onto the

inlet of a particular aircraft's inlet section. This will allow simulation of a aircraft at single point the effect of the aircraft upon the engine. On larger engines for instance must be done connected but, on smaller engines, the test engine will be of the same length as the inlet section where a gap is left between the end of the upstream nozzle and the engine inlet.

Although the facility will not be large enough to fully simulate a production jet engine, it will do so sufficiently to obtain pressure for various nozzle throat and angle of approach to the engine inlet will allow GE to in engine from low level altitude already and back and even reverse the engine (by bleedplenum) in case of altitude blowout.

An upstream set of the cell, surrounding E.F. flowcells, measures of downstream fluid velocity in front of GE to evaluate whether their engines are getting proper cooling from the upstream ducting.

He denied, however, that General Electric had any intention of designing its own ducts.

Other Additions

General's future plan for the facility include adding a motion platform at the exhaust end of the system to increase its ability to do another jet testing, especially on the nozzle regions. Other addition to the GE facility

(Gutaway) development facilities, most of which have just been completed and were exhibited to the visiting military and aerospace prospective customers, were:

- IBM 709 digital computer installed for paper machin for advanced aircraft designs. The computing center is currently used to do their house hold work on GE planes for maintenance applications.
- Magnetic tape data reduction center for analysis of high frequency plasma parameters, particularly kinetic and particle velocities. GE apparently has developed staff in programming and taking sets off the existing parts of their computers.

The accomplish that by delicate dithering operations to insert thermocouples and areas grids which are wired to telemeter multiple dials, which, as turn, transmit the data to the thermal input receiver. In the queue analysis and the plasma data in the data reduction center, GE can analyze the data to determine the composition and rotation, plasma, radiation and magnetic fields.

• Electron-microscope and hydrodynamic which develops engine controls to track the spray pattern so which air frame manufacturers have been developing flight controls. The section is planned around a control analog computing station equipped with Guidance and Electronic Applications units. Actual control parts, sensors, amplifiers and actuators can be tied in with the test-unit-linked analog computer to run the GE-designed engine simulate usually a running series to give quick and accurate "down" from the computer results.

Moving control parts during early stage stages can be simulated by the analog computer.

Then, the whole control part of the building can be wired into one building wide "broadcasting" of the system's data development and each group of engineers see how we look that suits us fitting into the overall dynamics of the complete system.

• Major engine component test section where an up to 110,000 per second generated by a 27,000 lb pump section is used to move airflows or internal combustion engines in a series of compressor, turbine and combustion test facilities.

• Material laboratory in which GE is working at solution to the ever-present problem of how to get the metals and plastics (and the way of fabricating them) which will allow the gas turbine to live up to its expectation.

• Fuel laboratory where GE claims it is independently developing some new high BTU per lb fuels.

Little additional news of the GE project for the Vanguard satellite project was officially released.



HOISTED CH-41 helicopters with boundary-layer-control system on main rotor loads a Cessna 190A used in earlier boundary-layer studies.

Boundary-Layer-Control System For Helicopters Tested by Cessna

A boundary-layer control system for helicopters that promises a substantial performance breakthrough for military wing aircraft has been successfully flight tested by Cessna Aircraft Co., Wichita, Kan.

The program, which involved a modified Cessna CH-41 helicopter, is the first successful application of boundary-layer control to that aircraft. It is the culmination of three years of study by the Air Branch, Office of Naval Research, and the Army's Transportation Corps.

Cessna officials refused to comment on the performance gains recorded during the trials except to say that "all concerned were extremely pleased with the results." It is believed that the CH-41, retrofitted by Cessna Aerodynamics Division, at a top speed of 123 mph, achieved considerably higher speeds with the boundary-layer control system in action.

Five flights by the modified CH-41 were made from June 20 to October, and the phase of the program was concluded last month. It involved several flights to 10,000 ft. Cessna said that the Office of Naval Research chose the CH-41 because of its high installed horsepower and aerodynamic cleanliness.

Delays Blade Stall

Basically the system is designed to delay the onset of stalling since blade stall which has been a major factor in achieving high forward speeds in both rotary and fixed-wing aircraft.

Use of boundary-layer control prevents the retarding loads to attain higher lift coefficients at higher than normal speeds.

Developed by Cessna as a result of work funded with the University of Wichita, the system installed in the

CH-41 test vehicle has an air pump installed in the right front seat in the cabin acting as an exhaler. The pump sucks air into the rotor blades through slots in the upper rotor surfaces through the blade structure to the airfoil hub where a combination cycling valve and rotatable shroud prevents ingestion of the air into the shroud from which it is vented outward as the left side of the rotor just behind the cabin door.

Boundary Layer Operation

The cycling valve applies suction to the blade slots only over that portion of the inner airfoil where blade stall is likely to occur.

Probe Aim: 'Total Picture'

Washington—The House Armed Services investigating Subcommittee's latest investigation of aircraft accidents will give the solid picture of all procurement for the Navy and Air Force, and the total picture of safety, and will not be a partial report, Chairman Ed and Elbert (D) La. has stated.

"There has for some time been an element of mystery about that subject simply because the whole story has not been told," Rep. Elbert said.

"There have been suggestions of occasional profits or unfortunate or inappropriate contracts; there have been fatalities associated with a multitude of things. But fatalities must be measured against the accidents."

President J. L. Averitt of North American Aviation, Inc., in the final issue speech that "brought in twenty representatives present," the American should have the best short delivery, procurement at all times." He said he hoped his company could "con-

tribute in a constructive way."

Rep. Helmer stated that the investigation will "not be a piddling expedition." He said the objective is to "consider the total problem as it is disclosed to the committee from their own books and by their own officials."

Chairman La. was scheduled to be the second of the 15 major committee investigations called to study the investigation a covering cost figures, profits and production schedules from 1952 to August of 1955. The Subcommittee Board has received contracts covering earlier periods.

Rep. Helmer said the subcommittee does not intend to suggest any findings to indicate from its own data that there was any wrongdoing nor by the cause of any particular of the accidents which compare in the target of the subcommittee's inquiry."

Future Crafts
27-World

AIRPORT WEEK, February 26, 1956

FOR FREON REFRIGERATION

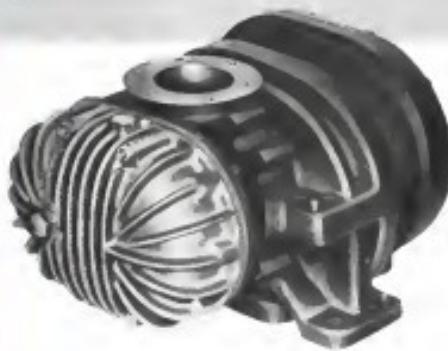


Globe Valve Acting
Compression Principle



Installation in Strategic
Probes Refrigeration Test Cell

Weight.....Tbs.
Size 10 lbs
Compressor



NOW, A HIGH SPEED POSITIVE DISPLACEMENT COMPRESSOR

Stratos' positive displacement compressor is ideally suited for pumping gases against high pressure static loads at relatively low flow - volumes such as are needed in fixed refrigeration systems for transport aircraft. Compression ratio is built in, avoiding backflow compressors, and is independent of speed. The compressor is single stage and simple in construction, requiring no complex valving or control systems. It can operate at high speed up to 45,000 rpm - keeping arms and drive, seals and weight down. Drive can be hydraulically sealed electric, turbine, hydraulic or direct from an engine.

Two balanced lobes rotate trip the rotating gas, compressing it in a confined area and deliver it to an exit port at the design pressure. The rotor set is of a patented design, with a unique form already proven in a variety of industrial and aircraft applications.

Stratos currently is developing fixed refrigeration systems, incorporating this compressor, for use in large transport aircraft. Other applications - such as pressurizing of high altitude aircraft - are being developed.

For further information on this interesting development in compressors write to:

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CONVERSION TEST begins (left) with aircraft in vertical倾倒 position. At right, rotors rising forward in move to horizontal.

XV-3 Converts In Ground Test

Bell's XV-3 tiltrotor prototype has successfully completed numerous low-speed conversion tests designed to find wing configuration and look-up rates as through the transition zone. The aircraft, shown here in a plastic-profile landing gear, at top left, shows a hybrid tail fin. Other component tests and leading pair slope tests have been performed since the Army monoplane completed its helicopter flight test last summer (AV, Aug. 28, p. 12). At Bell Aircraft Corp.'s Test Division in Fort Worth.



TESTING rotates XV-3 rapidly 45-degree angle and holds it until conversion.



ROTORS, at right, near end of transition from vertical to horizontal. At left, the XV-3 is held upright in horizontal flight.



Missile Guidance by Reeves

IN U.S. NAVY'S FIRST GUIDED MISSILE SHIP

USS BOSTON, first of the U.S. Navy's guided missile destroyers, highlights Reeves' important advances in the continuing program of guidance systems development in progress at Reeves.

By the U.S. Navy Bureau of Ordnance

Equipment installed in the USS BOSTON, born of successful experience with previous Reeves installations in USS MESSINGFFY and USS NORTON SOWELL, provides a few high degree of confidence production control.

At the ship-to-air missile flight path right up to the moment of impact.

Boston, now with the U.S. Navy and U.S. Air Force, goes back in the advanced stages of this successful missile guidance program.

If you are concerned with the placing of parts or sub-assemblies in the fields of missile or aircraft guidance, relays, pulse control, noise reduction or complete systems of any type, you should investigate Reeves' exceptional ... and the supply experienced ... research, engineering and manufacturing facilities.



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First U.S. Bi-Directional System Will Begin Operation in November

By Glenn Garrison

New York—The nation's first bi-directional instrument runway is scheduled to be in operation at New York International Airport by the end of November, according to the Civil Aeronautics Administration.

Instrument landing systems (ILS) at the northeast and east ends of New York's Runway 4-22 will begin in early November; and a second approach light system subsequently will be added to the ILS.

Equipping both ends of the runway with ILS will improve the airport's IFR landing capacity and, by reducing the need for circling approaches, should also ease the airport noise problem. In 1955, bidirectional instrumentation for ILS/ILS instrument runways would have allowed an estimated 1,150 landings that were not made possible by the single ILS.

Although New York International will be the first to receive additional ILS, Newark Airport's installation will begin shortly afterwards if CAA budget plans permit. LaGuardia, that airport's New York regional system may have a bi-directional instrument runway eventually, but its prospects are more obscure. CAA officials will discuss only the Newark installation, the only one mentioned in the present budget.)

Second ILS Criteria

All three New York airports meet the criteria for second ILS installations by CAA Airway Plan Study No. 1, which maintains "that the products and characteristics of head visibility winds are such that a second ILS would permit 700 or more annual instrument approaches which otherwise could not have been made." Among them, the New York airports could have accommodated about 5,800 additional IFR landings in 1955 by using bidirectional approaches, according to Part of New York's instrument installation.

The third major proposed ILS installation is the New York region, begun in 1951, also the CAA's First Region and the Port Authority completed a post study of air traffic flow through New York. Both agencies agreed that the installations were desirable. It was then up to the Port Authority, as operator of the airports, to prod the First Region to accommodate the installations and to get them funded funds.

From CAA's standpoint there were other problems, too, that had to be solved before bidirectional approaches could be established.

At New York International, for example, CAA delayed action pending development in a second instrument runway project planned at that airport. CAA decided to extend and modify the west ILS at the southwest end of the present runway, which will be parallel to and over the existing 4-22.

At the moment, however, since the second runway seems not to be an immediate prospect, the second ILS will be used for circling Runway 22 and will be moved over when the new runway is built.

Reduced Minimums

Possible landing minimums at Newark will be 200 feet and one-half mile for the northwest approach to 4-22, and 300 feet and one mile for the northeast approach. "The 'short end' of the present ILS (which includes the glide path and approach lights) will be 200 feet and half a mile for either approach.

The Port Authority already had assigned the necessary land for the new ILS installation.

Unusually short obstructions at the northeast approach to Runway 4-22 at Newark has been a "bar obstacle," in CAA's view, to recommending a second ILS at that airport.

The 288-foot-high "Gale Stack" has obstructed the approach since 4-22 was opened in 1951, and its removal was expected by the end of October with the usual blue construction cranes at the site. Lowering the industrial stackstacks would have created a health hazard, while leaving it up presented even the risk of circling approaches from the northeast at Newark. Runway minimums are 300 one-half at the southwest end, 300 one and a half from the northeast end.

Last week, however, word came that the first loads from the stack, and it should be down within the next six weeks. The Port Authority, with estimated federal aid, is paying \$500,000 for the removal of the pile.

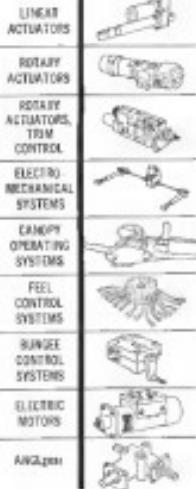
That problem solved, CAA's First Region has recommended the ILS addition to Washington, but natural CAA won't say whether there is a slot set aside in the coming budget.

LoGalbraith Approach Problem

The LoGalbraith instrument approach system is broken. The southwest, as mentioned, end of Runway 4-22 (the instrument runway at all three airports are parallel to one another in the

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How to wring water out of thin air...

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amount of regional traffic flow) is alleviated, and its maximum are 400-three factors, only slightly better than the 400-for the northeast overwater approach.

Installation of a northeast ILS at LaGuardia would mean moving the system out into Rikers Island Channel, a program for which has been developed, leaving a hazard when winds are high, leaving the instrument to an acceptable degree, even with an ILS in operation. The channel would have to be redefined if full length approach light sources were installed out from the center.

More Landings

Although, around ILS made, the Port Authority wants CAA to begin an moderate installation of 1,400 feet of approach lights-as far out as can be given without letting the channel-to improve the operating situation along the approach (IAP) Dec. 12, p. 81). The CAA was unable to be satisfied by the 300 feet established.

As far as the second TLS, the CAA wants a firm solution to the channel problem (inhibition or otherwise) from the Port Authority before any further action is considered.

It seems quite possible, therefore, that two of the airports will be making use of bi-directional instrument approach systems within the next two years, but that the third airport will do without for quite a while.

If all three airports are equipped with them by 1965, the CAA 15% will offer an estimated 6,000 landings, indicating that you that otherwise wouldn't be made.

U.S. Civil Aircraft Near 58,000 Mark

Washington-The results of active civil aircraft in the United States are now total 57,930, according to the Civil Aerospace Administration.

CAA has prepared a new publication, "Active U.S. Civil Aircraft in State and Cities," which shows the states with 6,000, Texas, 4,487; Illinois, 3,985; New York, 2,926; and Ohio, 2,376. For the country as a whole, there is an average of one plane to every 2,601 persons.

The ratio of planes to population is greatest in the six mountain states—Nevada, Montana, Wyoming, Idaho, Arizona and New Mexico—and in the five great plains states—South Dakota, North Dakota, Nebraska and Kansas. Grant County, N.C., has the distinction of having more planes in relation to population than any other county in the U.S. There are 29 aircraft and 1,057 people, or one plane to every 36 persons.

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Airborne Warning Signal for Helicopters

Developed at a search light for helicopters, shown installed on the tail boom (arrow) of a Sikorsky H-19E assault craft, the light, shown being tested by Avantek Engineering & Maintenance Co., Odenton, Md., (AVW, Aug. 1, p. 20). Purpose of the device is to illuminate search and landing areas. The system consists of two searchlights, each with a 100-watt incandescent "dash" lamp. According to Andrew Miller, the company's research director, the lights will quickly make known the presence of a helicopter in the sky, without giving off light in the air. They are used to be easily recognizable against ground lighting at night, so effective in doing so have not been considered range during daylight. The opposition weight 7 lbs., consume 4 amp. at 28 v. provides a beam of 140,000 lumens and a beam angle of 10°.

Stock Transactions

Washington-Aerospace, Inc., one year shares by no officers or Stockholders and Western Airlines is reported in the Securities and Exchange Commission for the period from Dec. 11 through Jan. 9. Arthur V. Nardino, officer acquired 20,000 shares, 25,250 through an exercise of options, making a holding of 65,740. Robert W. Nelson, officer, sold 20,000 shares, leaving a holding of 25,750. Shares through exercise of options, making a holding of 61,494. Charles B. Ralston, director, disposed of 1,000 shares, leaving a holding of 75,620. Other recent transactions include:

All American, Inc. Acquisition of one common share by E. Klemm, director, through exercise of options, making a holding of 1,200 shares. John T. Gandy, director, disposed of 1,000 shares, leaving a holding of 1,000. **American Cyanamid Co.** Disposal of 100 common shares by P. C. Lantz, officer, leaving a holding of 2,000. **Aero Manufacturing Corp.** Disposal of

4,000 common shares by W. A. Morris, director, leaving a holding of 6,000.

Bellanca Aircraft Corp. Disposal of 100 common shares by J. P. Arntzen, officer, acquisition of 100 common shares by C. E. Bellanca, president, making a holding of 1,000. Disposal of one common share by William H. Clark, director, leaving a holding of 100.

Bellanca Aircraft Corp. Disposal of 42,415 common shares by A. Albrecht, president, and 100 common shares by C. E. Bellanca, director, leaving a holding of 1,000.

Bellanca Aircraft Corp. Acquisition of 100 common shares by Edward K. Foster, officer, making a holding of 100. **Bellanca Aircraft Corp.** Disposal of 100 common shares by J. P. Arntzen, director, leaving a holding of 100. **Bellanca Aircraft Corp.** Disposal of 100 common shares by E. Klemm, director, leaving a holding of 100. **Bellanca Aircraft Corp.** Disposal of 100 common shares by W. A. Morris, director, leaving a holding of 6,000.

Cessna Aircraft Co. Disposal of 1,000 common shares through exercise by James D. Smith, president, making a holding of 11,000. **Cessna Aircraft Co.** Disposal of 200 common shares by Charles H. Collins, officer, making a holding of 200. **Cessna Aircraft Co.** Disposal of 1,000 common shares by C. E. Bellanca, president, and 100 common shares by E. Klemm, director, leaving a holding of 1,000.

Cessna Aircraft Co. Disposal of 100 common shares by Edward K. Foster, director, leaving a holding of 100.

Cessna Aircraft Co. Acquisition of 100 common shares by E. Klemm, director, leaving a holding of 100.

Cessna Aircraft Co. Acquisition of 100 common shares by Charles H. Collins, officer, making a holding of 200. **Cessna Aircraft Co.** Disposal of 1,000 common shares by C. E. Bellanca, president, and 100 common shares by E. Klemm, director, leaving a holding of 1,000.

Cessna Aircraft Co. Acquisition of 100



This is the newest Honeywell fuel gage.

Completely transistorized, it's smaller, more reliable, and as light as 0.8 pound per system. And like Honeywell's pioneer electron-tube gage, it's so accurate it measures any fuel load to within two-tenths of one percent.

Honeywell's fuel measurement systems are specified for more than 120 different models of aircraft.

AERONAUTICAL DIVISION, MINNEAPOLIS-HONEYWELL

NEWS OF G-E AIRCRAFT PRODUCTS



Problem: To cut armament system development time

DYNAT—that's the name General Electric gives to its new Dynamic Aircraft Test System which can now evaluate complete airborne armament systems during ground firing under fully simulated flight conditions.

Costly resources of aircraft armament systems can be released for other combat mission requirements. Extensive flight tests are necessary to duplicate actual armament system environmental conditions. This procedure is expensive, time consuming and often calls for a sampling of a system's performance. DYNAT allows that testing process by simulating the ground environment expected in aerial combat. In this way DYNAT saves time and money and gives a complete evaluation under all conditions required for combat readiness.

General Electric believes it has the answer to this problem with DYNAT, news' wks.

5. Remotely air loads on the ground DYNAT can be used for complete armament system and component evaluation. It tests the static load, tracking and aerial gun firing modes while the weapon system

is functioning. It consists of a group of units designed to simulate the dual conditions and provide continuous evaluation records of the problems that an armament system meets during the actual flight.

3. Test effects of own ship's motion DYNAT tests the ability of the armament system to compensate for the own ship's motion.

4. Radar noise DYNAT can set the effects of radar noise, either atmospheric, system or target generated.

5. Shock and vibration testing DYNAT can test the effects of shock vibration, that is, and may also excite noise that might be encountered in actual flight firing.

6. Windload effects Windload effects on the armament system with DYNAT can be simulated with weights and shock rods such that the proper load is applied to the weapon for a given angle of fire and condition of flight.

4. Complete environmental testing. Evaluation of DYNAT in G-E's all altitude test facility permits full firing production of any temperature from -100°F to +150°F.

DYNAT SIMULATES ACTUAL FIGHT. Every flight condition can be simulated by DYNAT. The fire control system tracking, gun control, etc., can be simulated which closely approximates an operational flight, the effect on the remaining system can then be evaluated through DYNAT. DYNAT models can then be checked against by using only a fraction of the facilities required to perform a full-scale ground test. The fact that DYNAT can simulate actual flight tests relatively quickly and inexpensively will permit the accumulation of statistical data from a far greater number of simulated conditions than is normally possible in a fixed test setting.

For more information on DYNAT contact your nearest G-E Apparatus Sales representative, or write for Bulletin GE-A-6143, General Electric Company, Section 210-99, Erie Road, Schenectady, N. Y.

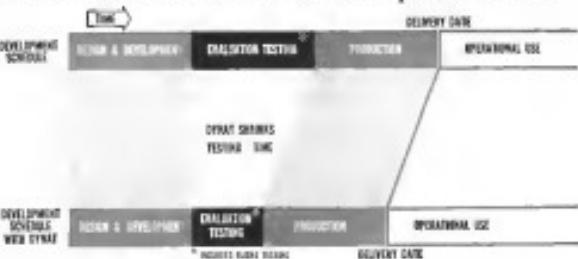


DYNAT assists aircraft engineers with needed answers to attack, precision and armament system's complex problems.



Foreground shows General Electric's all-purpose lifting base with DYNAT mounted. Controls lie to motor control room.

Here's how DYNAT reduces over-all development schedule



DYNAT's ability to reduce endurance testing time will help to get aerospace systems to service sooner.

G-E Transformer-Rectifier operates at higher ambient temperatures



Weight of one unit is only 45.8 lbs.

General Electric's latest addition to a new line of transformer-rectifiers is model 6857622. Weighing only 23.5 pounds, it actually beats the demands of MIL-P-1212 requirements. It can operate without derating up to 60,000 ft at 20°C, or 15,000 ft

up to 100,000 ft at 20°C, and a 35°C, 200 amp regulated unit is in the immediate future. To reduce weight at regulated heat, new circuit developments are being investigated such as the use of epoxy dielectric, wire, ceramic and aluminum. Use of silicon lead wire methods is under study.

OTHER DESIGN AVAILABLE. Many designs are available along with application engineering services on new and very special units, including units with built-in cooling means which are suited with fast cooling forced-air or free-air battery charging units have been used on the 200 amp regulated units, and ten options are available on request.

Lance G. Development indicates that an

SS-B, 100 amp unregulated unit is also possible (MIL-P-2222), and a 35°C, 200 amp regulated unit is in the immediate future. To reduce weight at regulated heat, new circuit developments are being investigated such as the use of epoxy dielectric, wire, ceramic and aluminum. Use of silicon lead wire methods is under study.

General Electric has done pioneer work in reducing size and weight of regulated and unregulated voltage power supplies. Check your nearest G-E Apparatus Sales representative for further information, or write for bulletin GEA-6113, Section 210-99, General Electric Co., Schenectady, N. Y.

New servo motor operating on B-47

Developed as part of a servo mechanism in the gun directorial computer system for the B-47, General Electric's new motor is designed to operate at 100,000 rpm at diameter. Weighing 8.5 pounds, it operates rapidly well in air level or at 50,000 ft provided the ambient altitude is at the lower end of the temperature range as stated in the general motor specifications.

DESIGNED FOR THESE APPLICATIONS. The motor was designed to meet the needs of the military specification MIL-M-5659 (ASG) and the various aircraft servo motor conditions of this type for short periods of time. It can be used as a power motor or a posisional computer system, in electronic devices, and can be modified for other aircraft and missile applications requiring a reversible motor capable of giving a high speed of response. It can also be geared to very low speeds where application dictates.

NEW MOTOR HAS THESE FEATURES: Rated at 0.002 kg at 6000 rpm, the new



B-47 servo motor is used in B-47 gun directorial computer system

Progress Is Our Most Important Product

GENERAL ELECTRIC

Sperry Sharpens New Executive Tool

By Henry Leifer

Great Neck, N. Y.—Sperry Gyroscope Co. is devoting a new weapon to those in the continuing struggle to reduce the cost of war and give the Government more for its defense dollar.

Cost-cutting for the weapon—the application of data-processing techniques to the problem of big spending management—includes setting up a system of more scientific inventory control based on the later “operational research” or other mathematical management formulas.

Cost-cutting research, a fairly new and still expanding field, hopes to find the solution to such complex, non-operational problems through the use of tools such as statistics and probability techniques, mathematical strategies representing physical situations at application of some theory and the feedback concept.

Industry, however, could never have credence the wide use of these tools taken the development of the high-speed computer which makes it possible now to solve in days what required years or months by old mathematical methods.

Feed-Back Concept

The feed-back concept is basic to many facets—a system puts out information first, fed back into the system, automatically controls behavior operation to achieve a fixed objective.

Sperry’s experience in the creation of feed-back systems has made the company conclude more that the value of guidance data gained out of these systems is no better than the factors and programming involved in. As with high speed “electronic lenses” and computers, the results can be useless if the input data is inaccurate or incomplete.

So, as the first step before instituting the new data processing technique, the company sees the need for developing up the ability of its spending manager to correctly evaluate the cost factors affecting inventory decisions. That opening phase took the form of a five-day seminar for 35 Sperry division managers on applying the principles and formulas of operations research to an earlier context.

The seminar was conducted by Prof. Louis J. De Rose, marketing and manage-

ment consultant, and head of the Department of Management at Fordham University.

Top-Level Approach

The top-level approach makes the program unique. Sperry believes in that it introduces the control factor of overall judgment as a first step before the selection and programming of cost side dots, and that it attempts to apply these new formulas from the top down toward the bottom up, in the most rapid computer solution of inventory problems. De Rose who has conducted training courses for the Aircraft Industries Association and a number of leading in-house committees, believes that the Sperry management seminar will bring in business men from all walks of life interested in such a high management level.

Reports from the line executives, outlining suggested techniques for more effective handling of inventories, are now being gathered. Many of the reports call for the use of economic formulas, with appropriate modifications to fit the variables of military production, as well as decision making.

Why Inventory Control

Sperry chose to start off the program with inventory control for several

reasons. It presents cost-based ramifications, offering engineering, production, cost control, purchasing, accounting, field service, ad-

ministration, planning, sales and other activities.

***Inventory Control.**—The effect of economies of scale and of the inventory level is amplified in the way it reaches the other end of the problem. One dollar saved here is equivalent to 10 dollars saved with the division manager were told. Thus, Sperry sees its reduced two-dollar inventory as a promising source of important besides funds for the company and its chief customer, the Government.

***Flexible mobility.**—Gen. Edward W. Rutherford, chief of the Air Materiel Command, has said: “Logistics is the muscle of striking power,” as striking is the bone.” Inventory control, De Rose points out, is one of the factors relating through the logistics muscle. It helps to get an organization—military or industrial—flexible mobility, which is more important in the air age than the mere stacking of weapons and supporting equipment, according to Gen. Rutherford.

General and Specific

In the seminar sessions, De Rose showed how Sperry’s inventory control problem could be broken down into separate workable parts, each one for more appropriately applied. Thus, at a final session the managers picked up De Rose’s theoretical outline and adjusted modifications to make it fit the company’s specific problem.

Inventory, De Rose pointed out, w

“For Want
of a
Nail...”

For want of a nail the shoe is lost,
for want of a shoe the horse is lost,
for want of a horse the rider is lost,

George Herbert’s maxim applies to electronics today as it did to riders three centuries ago. The point may be illustrated by considering a vital electronic unit made up of thousands of components. If the least of these components fails, the whole unit may fail—and with it a strategic military mission.

The problem of reliability is becoming increasingly important as the science of electronics advances. “Black boxes” are hard pressed to perform more complicated tasks with increasing efficiency. And at the same time, the requirements call for smaller dimensions. Notwithstanding environmental extremes of an order hitherto unknown, every

resistor, capacitor and relay must perform reliably. Each “rod” is critical.

That is why RCA is continuing an vigorous search for ways and means to increase the reliability of every component in an electronic unit. This program never ceases. It follows through from design to field endurance. Everything learned is immediately applied to current developments and production.

In seeking a degree of electronic perfection never before attained, RCA joins hands with others in this field. This matter of reliability is an industry challenge to be met by ingenuity, brain power and engineering knowledge wherever it is found.



DEFENSE ELECTRONIC PRODUCTS
RADIO CORPORATION OF AMERICA
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GIVE AND TAKE—Sperry division managers at seminar discuss a point with professors.



United Air Lines
Delta
Trans World Airlines System
Simulators for the BOEING 720/727



Pan American
World Airways
KLM
Royal Dutch Airlines
Simulators for the BOEING 720/727



Pan American World Airways
Simulator for the BOEING 720/727



U.S. Air Force
Air Force
Simulator for the BOEING C-97, C-124, and EC-170 TRANSPORTS



U.S. Air Force
Simulator for the PARNELL C-119 FLYING BOXCAR



U.S. Air Force
Simulator for the CONVAIR C-118 HORNET



U.S. Air Force
Simulator for the BOEING C-124 GLOBEMASTER



U.S. Air Force
Air Force
Simulator for the BOEING C-130 SUPER HERCULES



U.S. Navy
Simulator for the MCDONNELL F/A-18 HORNET FIGHTER



Air Force
Simulator for the TOSHIBA T-49 SUPER CRAYFIRE



Air Force
Simulator for the MCDONNELL T-49 SUPER CRAYFIRE



United Air Lines
Simulator for the CONVAIR 340



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Simulator for the AIRBUS A-300 & A-320 TURBOFANS



U.S. Air Force
Simulator for the BOEING C-130 TRANSPORT



U.S. Air Force
Simulator for the MCDONNELL C-130 TRANSPORT/STATION



U.S. Air Force
Simulator for the LOCKHEED C-130 TRANSPORT



U.S. Air Force
Simulator for the CONVAIR C-131 TRANSPORT/STATION

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**Electronic Simulators, built by Curtiss-Wright, save
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One of the greatest single factors in improving safety, and at the same time saving literally millions of dollars and military dollars, is the growing worldwide acceptance and demand for Electronic Flight Simulators developed by Curtiss-Wright. It costs approximately \$100,000 to keep a four engine aircraft flight deck for an hour. But for less than \$30 per hour, pilots and crews can "fly" the Electronic Simulator built by Curtiss-Wright—paying expenses almost identical to actual flight—while saving thousands of dollars in training multi-million dollar equipment for flying, not learning. U.S. Air Force studies show that it is a single training hour, our \$4,000,000 per year is saved by flightlessness.

The Simulator is constructed around the actual crew compartment of the aircraft it represents, complete with all control panels and controls. The physical environment approximates . . . but not the realism. The Simulator is a complete arrangement of moving controls, seat, seatback, and instruments. It is a complete arrangement . . . faithfully reproduces the flight characteristics, the engine and aircraft sounds of the prototype. For all precision purposes the pilot is seated. The feel of flying is in the regions of . . . the cockpit. He can move in any direction. The controller console is present here with problems he might not encounter in months of actual experience — air, over, down, each function of equipment, turbulence, varying speeds, changes of altitude, and lights off from of damage.

And no knowledge comes with the weather, geography, seasons which they

will later experience. The Simulator can reproduce any route in the world, all operational problems, complete to such things as radio static — in the flick of a switch.

So effective is flight simulation, and so varied is the range of crew flight training, that the Air Force has Electronic Simulators for every operational aircraft type authorized for production. Curtiss-Wright now has sixteen military and six commercial Simulator types in production and twelve Major maintenance and Upkeep contracts. The Simulator is the most effective and economical means of developing skilled crews.

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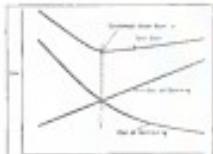
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INVENTORY CONTROL FORMULA: shows how costs of maintaining and obtaining stock can be reduced as greater quantities are ordered.

can material work in process, temporary parts and finished parts and finished products held in storage, awaiting use or sale, or in the process of being manufactured.

Its control requires the establishment and maintenance of inventories and provides methods of assessing inventories according to a production plan based on sales requirements, and of the lowest possible ultimate cost.

Then inventory control involves the determination of utilization quantity standards, establishment of an adequate control system, checking of physical quantities against records, reducing of waste through salvage operations, and the handling of stocks efficiently. Its value must be evaluated with regard to their value, to labor, their usage and their exposure to such risks as order cancellation and engineering changes.

Controlling Conditions:

In order to attain, at the lowest ultimate cost, it is necessary to consider:

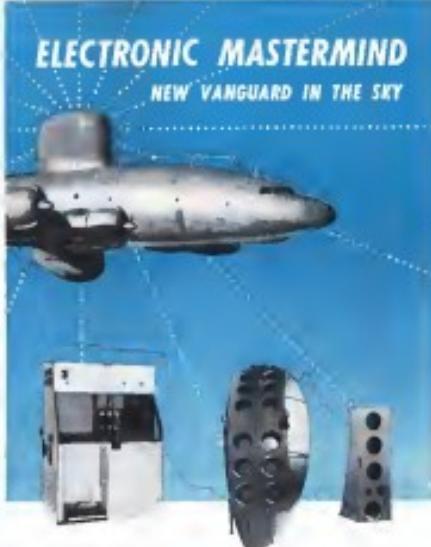
- Cost of obtaining involved in ordering and replacing production and purchased inventories.

- Cost of maintaining, reflecting the establishment, carrying, and holding of the inventory.

- Cost of losing out of stock, reflecting the price level and stability, inventory investment per unit not being used when required.

These factors generally combine in example of the common situation that it will need 1,000 units of a specific item for inventory purposes during the year, the minimum and cost of obtaining this quantity results when the entire annual requirement is ordered at one time. Furthermore, the company is sure it will have the men when needed.

However, the full year's high manufacturing activity will build up its stock space tied up in warehousing, possibly longer than later due to obsolescence and engineering changes. Thus, the costs of maintaining the stock go



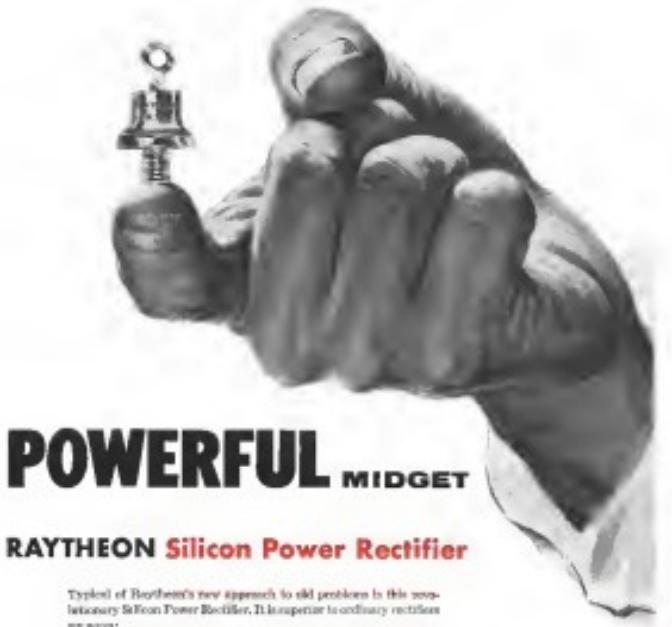
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up to the quantity ordered each time goes up.

A simple formula defining the "oversized order quantity," which has arisen out of infinite expansion with the problem, is one of the tools available for dealing with inventories. Dr. Rose and Once top management has project weighted the items of the former lower reliability have a unique grade which enables them to make inventory decisions without constraints taking up management's time on these problems. The formula

is:
[Quantity from the Economic Order Quantity Model] \times [Ordering Cost]

In order to use the formula properly, management must first factor into the item its own requirements.

Reducing the Inventory

Dr. Rose suggested that, in his experience, inventories at high levels increase the cost of doing business. In fact, creates a pronouncing premium—an excess weight—and at the first stage, no one seems to doubt that it is an excess of subassemblies, and so on, with each stage comprising the sum of previous stages. He also noted that management control might give start time protection. In other words, lead times for high cost in certain items are unpredictable; quantity must, management might protect itself by setting up a schedule permitting maximum production above intended delivery requirements.

Management may be carrying a high inventory of slow-moving items or produced stock as "assured" against bad delivery. Analysis of the flow of stock may be the procedure of getting the material back to an earlier stage of assembly. Dr. Rose said developing sub-parts common to certain products rather than those closer to the finished stage. This would provide a lead, due to date earlier at least cost than a single source at a later, and varied stage.

Another major contributor to high inventories is a lack of adequate standardization. Dr. Rose said, "This problem can be remedied partially by the broadening of standards with the simplest order and both in reducing the number of types inventories required. Methods can be cut correspondingly."

Manager's Viewpoint

A more useful weighing of engineering changes, balancing the economic cost against the expected performance improvements, would cut down an inventory problem. Is reducing the amount of stock that is available to obsolescence by these changes, Dr. Rose said.

In the general take of the discussion following Dr. Rose's presentation, the division managers generally felt the meeting could probably fit into their responsibilities.

- Study the situation differently to get exact data on what is done, and what needs to be done, and strength to overcome opposing viewpoints.

- Inform top management of the pros and cons difficulties at the working level, and present suggestion for their solution.
- Get from top management working goals and authorization to implement them.

- Set up my procedures and/or organization to do part-time or full-time, with responsibility for doable information of the problem.

- Improve communication and prevent "leakage" of channels between departments.
- Set programs in lower echelons.

- The reports from the individual managers after collection by J. J. Butterfield's office, will be circulated for consideration before final implementation, Dr. Rose said.

Industry Interest

The recently completed acquisition by Dr. Rose's company of the product line of the Navy's Grumman Avionics Division, has created a new interest in the industry, especially when it comes to the jet. The interest centers on the potential of the field to be provided by a third-line Telephone center of design.

In designing the PTFD, Grumman's objective was to keep the cost down to a minimum rate.

Grumman engineers wanted a flexible control system that would—

how to make a "Tiger"

roar!



TELEFLEX cable control
enables precision flexible action
on new Grumman PTFD

floating into napierian speeds, the pilot of the Navy's Grumman Avionics Division, has created a new interest in the industry, especially when it comes to the jet. The interest centers on the potential of the field to be provided by a third-line Telephone center of design.

In designing the PTFD, Grumman's objective was to keep the cost down to a minimum rate.

Grumman engineers wanted a flexible control system that would—

1. Meet handle load requirements
2. Be light and reliable
3. Be sensitive, accurate, reliable
4. Operate under the temperature extremes encountered in aerospace
5. Meet maintenance requirements

Finally Grumman chose many of these requirements, and more. The cable control, mechanized, remote control of the PTFD's functions, provides a means for the operator to move his hands about in a manner as natural as possible. Another control problem solved with Teleflex.

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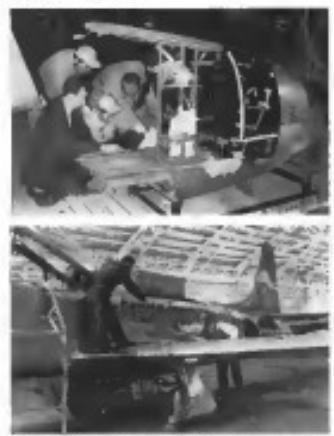


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PRODUCTION



RISING SUN EMBLEM the spars over Japan on wings of 110 jet trainers (left) assembled by the Kawasaki Aircraft Corp. Picture at right shows U.S. technicians from Lockheed instructing Japanese engineers in assembly methods for the T-33.



Japan Assembles T-33, Enters Jet Age

By Dan Koenigin

Tokyo—Japan successfully tested its first postwar domestically assembled jet aircraft in mid-June, silencing critics who said it was impossible to do so soon after the end of the war.

The plane was the first of 180 T-33s scheduled for assembly and eventual assimilation in Japan by June 1958 for use by the growing Japanese Air Defense Force.

Pioneering this comeback of Japan's aircraft industry is the Kawasaki Aircraft Co., which is putting together the T-33 assemblies with technology read in from Lockheed.

According to Lockheed technicians, the Japanese firm is doing a remarkable job. The 300 Kawasaki employees working on the project are averaging an 80% learning curve.

Only 4,800 man-days were required to assemble the first T-33—1,200 man-days beyond optimum. And the quality of their work was reflected in the flight tests which revealed only very minor faults in the finished product, although Kawasaki had been able to do

little pre-flight ground testing because of the lack of equipment.

"Once these Japanese learn what to do, they do it as well or better than most American technicians," Lockheed's chief subcontractor, Michael Clegg, told AVIATION WEEK.

The one American complaint has to do with the fact that the Japanese tend to take things extremely literally. U.S. standards, thus, seldom question orders given them, even if they know that orders may be faulty. Thus, the U.S. engineers at Kawasaki say, they must be doubly careful to give instructions 100% correct all the time.

To Build 180 T-33s

Kawasaki is to turn out 180 planes in June 1957. The total cost of about \$156 million for this time segment of the program will be divided between the U.S. and Japanese governments, the former providing around \$114 million, the latter, \$72 million, or 39%.

The U.S. share will cover technical aid, licensing expenses and all costs in

connection with the production and handling of parts until they are loaded on Japanese ships at the port of Los Angeles.

Engines will pay all subsequent costs associated with transportation, assembly and flight testing.

After all, says Clegg, costs to be considered in the agreement, seem to be too high. "At present," he says, "it would cost about \$8 million from July 1957 to June 1958. The percentage each country will pay will probably be varied under the second. For an entire aircraft to pass through parts associates, American shipments will diminish significantly."

Kawasaki's T-33 production schedule for 1956 calls for one each in January, February and March, two each in April and May, three each in June and July, five each in August, September and October, six in November, eight in December. The schedule for 1957, says Clegg, is: one in January, ten each in February, March, April, May and June.

Three of those scheduled for completion in June 1957, however, may be carried over to the second program that

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These skills are being used by Kawasaki working firm, of about 350, which will grow to 2,000 by the end of 1956. The Americans do not share ability to the western French. Both roads through a Japanese counterpart who desires the work to be learned what it is.

Other Licenses in Progress

Lockheed is producing Kawasaki's addition to its product line with many Boeing parts from its own manufacturing plant and obtaining other components from subcontractors in the U.S. It also is among licensing contracts between American manufacturers of parts and Japanese firms.

Up to now, British International has licensed Tokai Kogyo Seisaku Co. to produce arm and tank rubber acceleration shock absorbers, steering and engine heat controls, Yokohama Electric Mfg. vibration dampeners and isolators, various bushings and bearings, and instruments using the equipment, including fuel flow meter components. Shinko Electric Co. inverse current relays, voltage regulators and control panels, Kuroha Kogyo KK, main wheels, nose wheels, main hydraulic tubes and couplers, Yokogawa Kikaku Works jet turbine systems magnetic recording vacuum mag-

netic shielding and insulation, and igniters are available.

Convair Pacific Co. has licensed Japanese Aviation Industries to manufacture Convair aircraft. An agreement between the R. P. Goddard Co. and Yokohama Radio Co. for the production of fuel cells is now pending. Other accords are also being negotiated at present.

However, difficulties in concluding many of the anticipated contracts will considerably slow down plans for a gradual switch to Japanese-made parts.

New Production Facilities

So far, about 15 have been made under license contracts in old inadequate buildings at Kawasaki's Gifu plant. But the company is now spending \$4.1 million on new production facilities that will be ready for use in next April. About \$300,000 is being spent for land \$853,000 for buildings (including new structures, construction, expansion and removal), \$1,350,000 for raw equipment, \$1,400,000 for tool and tools, and \$400,000 for other items. In addition, equipment costs will run to \$2 million.

An assembly plant with a floor space of 175,000 sq ft is almost completed and planned for Lockheed equipment. 25,000 sq ft of office space has been built. New old buildings, will now need for defense scheduling, lightplane production and assault craft. The first 1,150 are being fitted out for parts manufacture. Total floor space



KC-135 Section by Rail

One of the largest Boeing sections ever to be moved by rail arrived recently at Boeing Airplane Co.'s Renton, Wash., plant after a custom-made trailer journey from San Diego where it was manufactured by Ryan Aeromarine Co. under a Boeing subcontract. The section will become part of the full production model of the KC-135 jet tanker being built for USAF.

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match 215,000 sq. ft. Machinery being installed, mostly Japanese-made, includes slot and spur milling machines and stretch presses.

To meet these expenses, Kawasaki will sell \$1.4 million of its own capital and hope to obtain \$1.2 million in Ministry of Finance Administration funds and \$100 million from foreign banks loans. Geki bank loans will be adjusted to meet operation expenses.

Robotics Industry

The T-31 project will have significant effect on Kawasaki's growth. The offspring of the present Kawasaki Aircraft Industries Co., which 50,000 employees turned out military aircraft during the war, has increased its expenditures from \$2,450,000 in \$1,866,000 in November 1957, about a month after the T-31 program got underway.

Existing companies were working on the project. Kawasaki was a leader in more than 3,000 modern, original designs in Geki and Koko manufacturing divisions.

In addition to new facilities being added for the T-31 program, Geki has a total area of 974,000 sq. ft., a floor space of 475,000 sq. ft., and machine tools worth 1,104. Kawasaki has produced here the RAI-1 line in 1951 and KAI-2 jetison planes, as well as target aircraft for the Japanese air force, and the KAI-3 fighter for other aviation schools. Also, aircraft for the U.S. and Japanese air forces are assembled here (197 in 1958). In addition, Kawasaki has produced about 700 400-hp boxer aircraft at Geki.

The Koko site has a total area of 990,000 sq. ft., building floor space of 1,49,000 sq. ft., and machine tools totaling 1,000 units. Kawasaki Koko started out the Bell helicopter in 1954, 14 in 1958, 21 in 1959. Japan's only facilities for the complete overhaul of jet engines (143 in 1958) are also located at Koko.

Over \$2 million was spent in 1954-55 installing these facilities. The company now manufactures 240 hp aircraft engines here, as well as test facilities, propeller gears, match propellers and small engines.

The Profit Picture

The T-31 program will greatly enhance the company's advantages and financial standing. An annual profit from the program is likely to be from \$1 to \$10 million.

Under the U.S. Japanese agreement, the price of the T-31 aircraft based on the average of the first 100 planes has been pegged to 100 million Yen (\$172,000). Of this amount, \$54,000 will be borne by the U.S.

Thus, the serial purchasing price to be paid by the Japan Defense Agency would be \$73,000. Kawasaki, in its 1956



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HELICOPTER MEDICAL MISSION CROSSES AFRICA—Crossing African jungles and bushland from Léopoldville, Belgian Congo, to Nairobi, Kenya, the Lederle-Sikorsky Medical Expedition flew 2,800 miles in a Sikorsky S-55, distributing drugs and surveying health conditions. The expedition again showed the significant role of the helicopter in public health work in Africa. For several years Sikorsky helicopters have been used there in spraying operations to control the tsetse fly, carrier of sleeping sickness, and for other vital health missions. The helicopter's ability to reach inaccessible areas opens new possibilities for the development of equatorial Africa.

copter in public health work in Africa. For several years Sikorsky helicopters have been used there in spraying operations to control the tsetse fly, carrier of sleeping sickness, and for other vital health missions. The helicopter's ability to reach inaccessible areas opens new possibilities for the development of equatorial Africa.

AROUND THE WORLD WITH SIKORSKY HELICOPTERS



TO THE ANTARCTIC—Landing on the Coast Guard icebreaker *Roosevelt*, a Navy Sikorsky HSS-1 helicopter joins Operation Deepfreeze, the U. S. antarctic expedition. The *Roosevelt* sailed from Boston in November. The HSS-1 is a Navy version of the famous S-55 which serves in quantity in each of the U. S. armed services and is the standby in commercial and military operations all over the free world.



S-55 FOR COMMERCIAL SERVICE—To enter airline service in the U. S. and Europe in 1956, the Sikorsky S-55 is the largest helicopter made available for commercial service. New York Airways plans to buy 7, Sabena Belgian World Airlines 8, all to be delivered starting in the spring. Both airfares currently use S-55s. The new S-55 will carry 12 passengers and will cruise at more than 100 mph against the earlier model's 65 m.p.h.



HELICOPTER HISTORY



FIRST SHIPBOARD LANDING

In May, 1943, Capt. (now Brig. Gen.) E. Franklin Gregory landed a Sikorsky XH-4 on the deck of the tanker SS *Bunker Hill*, on a successful demonstration of a helicopter's capability to operate from the small deck of a merchant vessel. The demonstration took place on Long Island Sound off Connecticut.



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wants to raise the price to about \$24,000, but will probably settle for about \$15,000.

In any case, the important effect of the T-55 project on Kawasaki's financial position is indicated in the following projection:

From April 1955 through March 1958, sales of 300 aircraft and profits of \$160,000, the company expects to turn in sales of \$14.7 million and profits of a little over \$1 million in the year April 1958-March 1959. For the full year, April-September 1959, the company expects sales of \$55.6 million and a profit close to \$700,000.

Not calculated in these figures is the business Kawasaki will do at several prospective jet equipment manufacturing projects yet underway or planned. Under a \$20-million program now being considered by Washington, Kawasaki will receive contracts from the Allison Division of General Motors supplied through Lockheed, which would manufacture the J57 jet engine over a five-year period starting next September. Kawasaki again, like Industries, would produce 307 jet engines with General Electric Co.'s turbines and in a \$33-million five-year venture beginning in April 1958.

Moreover, Kawasaki, together with other Japanese aircraft companies, is now designing an intermediate jet trainer for the Japanese Air Defense Force. If this model is selected for service, another 100 aircraft is slated to be received this spring—it will obtain sizable orders for the IJAF. Preliminary word toward that date have already been received.

Finally, Kawasaki and Lockheed are already thinking of producing F-104 fighter bombers in Japan when the demand for T-33s starts to taper off, probably in 1958.

PRODUCTION BRIEFING

► Contract for \$15.5 million has been received Boeing Aircraft Corp., Seattle, Wash., by Lockheed Aircraft Corp. for TVN Navy jet training wings. The supply contract will extend Boeing production to October 1957.

► First plant tooling and laboratory facilities have been established by Metallurgical Consultants, Inc., 4411 E. Shadel Ave., Milwaukee, Calif. New facilities opened by the firm, organized two and a half years ago, cover over 5,000 sq. ft.

► Microfilm active records systems will be handled by a new service department of Phoenix Division, Electro Folder Co., Post Office, N.Y. 3.

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Britain's Aircraft Needs: Part III

Equipment Dearth Slows British Research

By Sir Roy Fedden

Tuning now to a number of technical matters which have held back the production of the new family of postwar British aircraft. Thus I am able in the final analysis next, to an considerable degree, to lay at the door of the chief engineer and senior executives of industry.

Seeing that the aircraft industry is usually good by its dependent upon a Government department and that the Government's attitude that first consideration must be given to Government requirements, both by national and financial stand points.

I could have hoped, however, that a clearer understanding between the technical sides of industry and the Government would have presented that simplified validation and acceptance policy that has existed in several countries.

Because of changing political conditions and situations at home and abroad, there is also the role of controlled or reduced contracts. This has left all the work that can get implemented to those capable of taking it effectively and as a sensible sum. The number and rather increased emphasis of setting up every rule possible, has resulted in some firms in the country that have no design team at all being hopelessly overruled.

Design Frustration

This is all made more difficult because aircraft design is so much more complicated than 10-15 years ago and covers a far wider field of interests than aircraft and associated equipment. Designing for this calls for a large team, resulting overall a total design capacity of something from 10-20 times the size of an aircraft of the last War.

This has been realized in a few cases on certain but deplorable sites of frustration in the design team, hours of sleep of not being able to get on top of an impossible mountain of work, which tends to leave a design as it is, either than grapple with a problem early, perhaps, indeed, and lead to a failing that measure, or after the problem will be got right and in due course produce all fail.

I would like the rest of many of these troubles as a Government director can allow himself sufficient investigation. In consequence we are at least a generation behind the American

in flight, and more than that in the basic knowledge needed to produce Math 2 machines.

Certainly 10 years ago last what it was desired, every other end of the War, to start high-speed research by dropping models from Messerschmitt, which was fortunately later abandoned by that far-sighted man, the late Mr. Wilfrid Perring.

Even allowing for the basic work which America takes off design engineers, present and with the usual 10% of the overall strength of their aircraft technical staffs involved with ours, the still has an advantage of about 25 over us. For example, for 3,000 British designers, draftsmen, technicians and test staffs, the American minimum requirements would be 1,000, but then disengagement and大陸化 in taking extra place of design, aerodynamics, structures, high and low temperatures, electronics and instrument research etc., will double this figure to 6,000.

Priority Numbers

Out of the mistakes made since the end of the War, but often reported by the Committee on the last War, was the "priority numbers" issued all over priorities. This has been fully vindicated already in Parliament and to some extent removed, but it should have been appreciated by our technical people and omitted again long ago, and it does not keep one content types just running, for these can only rise be kept while production starts.

I would hope that the recent decision of setting up separate design firms, which has sprung up owing to such difficulties, is only a passing phase and an outcome of the design stress as the industry has had to bear. Much potential expertise has also been lost, and one can not get the personal touch or enthusiasm in this way and fast review, development and production in the early stages is the key to efficiency and is largely a matter of incentive thought and effort at a united team.

Computer-Technique Log

British design executives, desperately overburdened for several years, did not in the main and themselves at early, or least not the time to investigate, the very real advantages of computer techniques in comparison with their opponents in U.S.A. To the States, this most important aid to the design and evaluation departments has long passed

the novelty stage and has now become a valuable day-to-day tool in the hands of the aviation engineer. The field of widening still in an amazing pace, and without this equipment a designer would be almost as lessened as it would be the case if he were deprived of some proven working principle.

Information originally in these papers at odds in the open department, it has been found of immense value in many other fields.

With our shortage of technical staff it is particularly appropriate that full induction into the British industry, and it is hoped that Cranfield College of Aeronautics will be able to supply or suitable trained staff for this work.

Aircraft Materials

Up to the beginning of the second World War, Britain was leading in aircraft materials by a considerable margin. Forget me not I do not think this is the case today.

I am not referring to work in timber offices, although quite a bit of timber during that I referred to is the legal timber, introduced into the nation, we are well behind U.S.A. in the use of that material.

I am rather referring to our general approach and I believe it is almost materials generally.

I do not consider this country has kept pace with materials since the War with the available improvements in technique. In the whole aircraft field alone is there a Bantam, Hatfield, Standard, Johnson or De Havilland?

Collaboration Head

I am hopeful that Cranfield may be able to play a greater part in materials in the future, but I am not optimistic.

I feel the technical side of the aircraft industry, especially interested depth, in tragic problems over the end of the War, might have got out of their difficulties faster if they had more closely collaborated with their corresponding numbers in the engine industry, who have had that happy with them for the last 30 years. It is possible it is not yet too late for a closer collaboration?

After the War, as a result of visiting the first one or two machine tool exhibitions, I took this report British industry was really lagging ahead, but I repeat to say that in the aircraft industry is concerned, I am of the opinion it is now falling behind.

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test engine and aircraft plants and at so many new German, Swiss and American machine tools. With the definite changes in type of manufacture that are coming along, this is likely to become still more emphasized.

It appears to me that in the post-World War II period the U.S. aircraft industry had the best facilities for the first five years after the War. America has made great strides and a new birth thro', on our backs, and I attribute this direct cause to the great boost that has derived from adequate research equipment based on what we see in Germany immediately after the War.

Mobilization and change of policy has put back our leading air hill scale aircraft engine test equipment. This is required now only for research, but also for early evaluation of new products.

The tremendous job that the U. S. A. has done in the country (or experiments) are prototype engine test rigs are extremely impressive. The advantages that accrue to these engine test rigs, in having the Country plan turned at Cleveland for testing the latest engines in the Mach No. range, of 2 to 3.5 exhaust in one year, coinciding with research in combustion chamber.

Our Government is including the winter job in the defense a year, and it is anticipated that we may have in four years' time equipment comparable with what the U. S. A. possess today.

It would be good to know that one British firm has taken on the responsibility of their own aircraft engine test rig, and will be ready at least a couple of years before the official equipment is ready. In the meantime, other countries are planning even more advanced rigs.

Wind-Tunnels: U.K. v. U.S.

Similar remarks must be applied to aircraft wind tunnel equipment, although new tunnels are planned by the Government, it is doubtful if they are extensive enough as the high Mach No. range, and this is without even mentioning of course the two transonic wind tunnels at Langley and Ames Laboratories in U. S. A. which offer superb facilities for continuation to obtain comprehensive measurement in large scale models without an air flow satisfying with base research. Once again, it is difficult to put into words exactly the advantages that will accrue over the next few years in a result of these N. A. C. A. tunnels.

Cleveland and Ames Laboratories were available to the R. A. F. (Royal Air Force) Scientific delegation inspection last summer. No comment on these comments has been taken of the comprehensive facilities of the U. S. A. A. at Transonic at the U. S. Naval Air Station at West Thetford. In this country, we are at present

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very equipped by an authority to make the high quality supersonic missile required by this advanced need, and this agent is a sworn "little red." Thus, missiles will at present follow the best part of a year to make little red little threat on the same range of combat strength until the missile would not be

threatened by the newest weapons available.

It is felt that some designers and a number of Government officials are not yet convinced about the matter, and that education on the background of the old theory that has been described is to go so long as this country, that we can get by without this class of equipment.

Body Modified

It is tragic how badly this whole question of engine and aircraft has not been handled since the War. First, in inferring that they were not anxious at all, and then when at last the facts became apparent, belligerent on the right rather to adopt and do steps that would have to be taken to meet the situation like the required financial resources. We are a long way from being out of the wood yet on these vital matters.

It is tremendous progress to see the morale and location that can be expressed with bodies such as exist at Edwards Base. With modern equipment overall, which we just around the corner, it is quite wrong to let us, in fact, play in development of new problems on certain weaknesses of these aircraft.

The attempts to use North Africa base to be here in simpler, more adequate staging, and the whole matter requires looking on as entirely different and more realistic base.

'Clean' Instruments

Not all our test pilots have the technical education and subsequent training necessary to deal with jet-and-day flight problems; some of the firm performance departments are inadequate for formulating flight test programmes and setting them carried out. You must yourself have left the time or resources for these to Edwards Base, and I am seriously worried about their first flights by novice pilots.

Our aircraft instruments are clean and body compared with those of the U.S.A. Admittedly, there is more opportunity in a greater home market in America with, of course, more competition, but our instrument makers appear too often in part and take excessive advantage from M. D. B. (Marshall Aircraft Establishment, Farnborough) instead of going ahead on their own and keeping in touch with American techniques and development.

I understand a committee has been acting for about two years to decide

whether we should have a heavy industry or not, in absolute necessity for the war against supersonic technology. I believe the members of this committee that have been working in the war will be entirely satisfied to have the proposed enough that will be able to make itself clear.

Second, there is a case where we just could not go wrong by going ahead to see long-term heavy pens for a number of supersonic aircraft, which without any possible doubt will be required. I gather that at least the aircraft specialists are coming sound in thinking that want a pen, but it must not be more than 75,000 tons.

'Incredible' Approach

Why this figure suddenly? I should say at least of 100,000 tons was necessary, seeing that it takes over 100,000 tons to bring down a ton of iron in the States.

The necessary complete approach of our industry on this matter should be somewhat of the severe criticism some 20 years ago on our purchasing work, on forged articles loads and in legal writing, dealing on the issue of extrangements and the fact that U.S.A. still loads more cost. Our team, long ago, has been oblivious, on large high efficiency piston engines and in U.S.A. today the most modern flying and integral casting techniques are universally used on the engines of all long-haul transatlantic transports.

Industry's Responsibility

I feel that the R.A.F. which is composed almost entirely of technicians from industry and the scientific branches of the Government has missed a great opportunity since the War in not giving this industry both its leadership and guidance to prepare them for this new batch of aircraft. I believe it was, and still is, the Service's duty to take the lead in association with all experts relating to technical education and problem relating to technologies in aeronautics, and to me, no one with an interest would, nor forces can be mobilised and used in a better and more practical degree.

Turning now to the responsibility of industry, I feel the S.B.A.C. (Society of British Aircraft Constructors, Eng.) has failed to appreciate fundamentally the great change that has come about in aircraft technique, and that whereas the Service and all its officers have applied themselves this profit in their tasks, it has for the most part been along the line of the traditional jet and would rather than a new approach. By this I do not mean "bigger and better," in the sense of expending huge sums of money, but

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Fiat Fighter

Latest model of the Fiat G.91 light ground-strafing fighter now under development for the North African Treaty Organization shows the similarity between the Italian design and the North American F-86 Sabre being built under license in that firm. The G.91 is being designed by a Fiat engineer from under Prof. Calandri. Powerplant for the G.91 will be the Bristol Orpheus, now running ten 3,000-lb. thrust mark, to test. G.91 is competitive with two French designs, the Breguet Tropic and the Dassault Meteor 21 units.

rather an appreciation of the profound changes that have come about, and the need for different tactics.

Over this difficult post-war time I had hoped that the R.A.F. and the S.B.A.C. might have more clearly defined functions and it was intended to do this in the excellent new J.A.S. Institute of The Aeronautical Sciences, Inc. (block of buildings at Los Angeles) the trade unions had our advice and were fully in touch with their technical counterparts in a very marked degree.

Breeder Set-up

Industry, of course, has its many difficulties and problems, and the S.B.A.C. in its 10 men or so of life has been efficiently organised as a successful trade body, but I think it can get no more a broader and more important range than it is at present. If we, as a group, can get the new type of British aircraft planned, timed and followed in a better and more practical manner.

Turning now to the responsibility of industry, I feel the S.B.A.C. (Society of British Aircraft Constructors, Eng.) has failed to appreciate fundamentally the great change that has come about in aircraft technique, and that whereas the Service and all its officers have applied themselves this profit in their tasks, it has for the most part been along the line of the traditional jet and would rather than a new approach. By this I do not mean "bigger and better," in the sense of expending huge sums of money, but

the way they think they ought to go to this model episode does not fit the bill today.

(This is the third in a series of four articles in which Aviation Week is reporting S.B.A.C. officials before Britain's Aircraft Conference on Problems of Aircraft Production. Dr. Ray has served on their committee as president of the Association of British and is a former aircraft officer in the North Atlantic Treaty Organization.)

Forging Development Eases Titanium Blade Problems

A new titanium forging process, said to make it possible to produce forged plates of aircraft-grade as cheap as rough forgings, has been developed by Castrol Steel Incorporated.

The new technique is based on solid-state by a series from Ghosh Engorged Ltd., in developing a supergrade titanium, which is claimed to be stronger than conventional titanium and to eliminate production of the characteristic porosity of previous jet engines by removing the tendency to consume metal.

Detailed are guarded, but it is believed that the new process overcomes the usual problems of titanium production such as chemical affinity for hydrogen and oxygen, which cause the metal to become brittle and to scale, and also result in distortion during forging of thin sections.

U.S. manufacturers have already adopted the new titanium turbine blades.

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New Installation Silences A3D Run-Ups



TRACKS GUIDE PLANT as tracks loads it into position. The track train that carries pallets into site or out of main hangar, without drivers.



JET IN MACHINERY HOUSE Sliding steel doors close off during engine run-up.

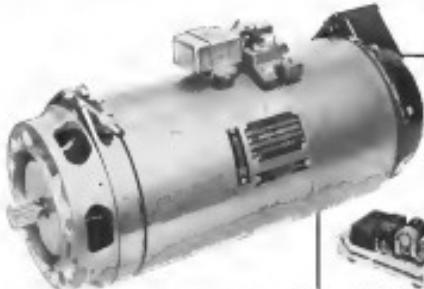


MACHINERY HOUSE closing shows how lower radio-elevated sliding doors make tight seal against engine pod pillars, blanketing noise of 30,000 lb thrust engines. Doors are operated hydraulically.



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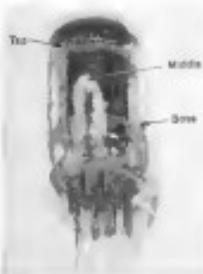
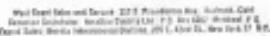


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TRIETHOXYLATES were purified at these locations as before to about 90% purity.

line-equipped JAN, USAF Type B
shells, and with no shield.

Collins checked a large variety of shield combinations, including short-JAN, black JAN with serif letters, no dots, short JAN with Collins letter and base metal, black JAN with shield base only, black JAN with shield letter and base metal and the two IERC shields. In his test results, Collins classifies the IERC (ECAF) Type B shield as "Commercial Type B" and the same short JAN replacement as "Commercial Type A".

NREL Test Results

Tests at NEL revealed that whereas a conventional IAN shield always receives the hot spot operating temperature above that of a bare shielded-hole tube, the addition of an NEL layer drops the temperature approximately twice that of a bare tube.

In some instances, depending upon the tube type, its power dissipation and whether it normally operates at a very high temperature, the hysteresis or distortion behavior of the NEMT can be quite different from that observed with the EBC. In other cases, the EBC Type B appears to offer appreciable further reduction in tube hysteresis.

NEM tests on Type 3818A tubes equipped with a plate dissipation of 2.75 watts per plate, in a surrounding air temperature of 70°C, had a wave distortion of 0.001% at the following rates of:

- 150°C rise with a JAN shield;
- 130°C rise with no shield;
- 70°C rise with most-equipped JAN shield.

* NRC case with HRC Type B shield.

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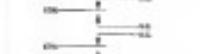
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AT SEA LEVEL

Resistive, 4 amperes
Inductive, 2 amperes
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Resistive, 4 amperes
Inductive, 2 amperes
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*Electrical ratings calculated with dielectric strength of 28 volts.

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Two double pole,
double throw contacts

ELECTRICAL RATING at 28 volts (in unsealed condition)*

INRUSH

Normally closed, 24 amperes
Normally open, 20 amperes

AT SEA LEVEL

Resistive, 4 amperes
Inductive, 2 amperes
Motor, 3 amperes

*Electrical ratings calculated with dielectric strength of 28 volts.

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The switches are sealed so that operating characteristics are unaffected by changes in atmospheric pressure, thermal aging or vibration. The switching character within the housing is uncoated, thus filled with dry inert gas and sealed. This prevents any effect of atmospheric changes and is excellent in all categories of exposure within the switch character. The contacts operate from a and which keep dust or moisture from entering. Photoelectric switches have an uncoated ring.

The switches are designed for bracket type, or through-hole mounting. Leads are supplied, one for each terminal, the number depending on contact arrange-

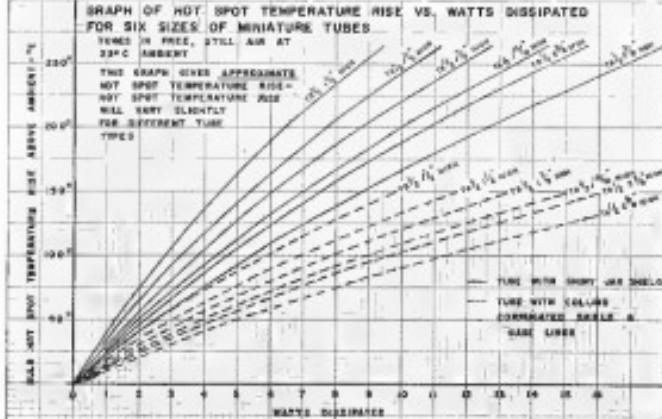
ments and terminals. The leads project 1/16 inches from the base of the switch. They may be bent in any direction by rotating the switch as required.

The switch type designated as (A) has a roller-plunger actuator for sealing and a positive drive actuator. The switch also has a coil for each operating system. (B) has a positive drive actuator for delayed operation, the type designated as (D) is designed with a plunger actuator for on motion operation.

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HOT SPOT TEMPERATURE of miniature tubes in EAC ambient can be determined approximately from this nomograph prepared by Collins Radio Co. Solid lines show temperature for their JAN shielded model tubes; dashed lines for JAN shields equipped with Collier heat dissipating bases. These models incorporate measurements on specific tube types against speed test set-ups.

ments apparent on a tube with the 6068 where it is evident at a higher temperature ambient. For example, when the 6068 is operated in 120°C ambient with a plate dissipation of 11.2 watts, NEL finds the following hot-spot temperature rises:

- 270°C rise with JAN shield
- 180°C with no shield
- 180°C with anti-creep shield
- 140°C with EAC shield

Collins Test Results

In order to measure the effect of the tube heat source, Collins made four separate measurements of three parts of the tube cage.

Thermocouples (No. 4 gauge copper constantines) were embedded in the envelope at the tip, middle and bottom portions of the glass numbering the tube's electrode section. The eight different types of shield arrangements were then mounted in an aluminum chassis, each supported by a 6-mm phenolic bolt. This permitted natural convection cooling, but prevented radiation between adjacent tubes.

A graph plotting tube hot-spot temperature rise versus tube shield type is shown in p. 87 for the type 6068 miniature tube type. Temperature rise is shown for the three locations along the glass envelope. The graph reveals

the maximum temperature rises to be as follows:

- 181°C rise for plain JAN shield
- 151°C rise for black "windshield" JAN shield
- 150°C with no shield or shield base
- 121°C with HERC Type A (JAN replacement)
- 104°C for plain JAN with Collier shield base and base insert
- 98°C for black JAN with Collier shield base insert only
- 94°C for black JAN with Collier shield base and base insert
- 94°C for HERC Type B (USAEC Type III)

With a number of firms moving into the field of manufacturing NEL tubes,

Motor Cooling Too

The enormous heat generated and as the new tube shield must fit into a tube otherwise for cooling small servomotors.

Some recent installations are reported the elongated metal shield serves much, thereby increasing the radiating surface to 50%. According to A. O. Maser of Atlas E-E Corp., one of the firms now making the elongated bases:

the competitive situation is keen and the price pattern is fluid. However, it is noted that the NEL tube itself requires a low cost addition to any system.

In a recent Navy competition for procurement of several thousand three and NEL shield bases, prices quoted were from 14 to 21 cents each. Alvarado Works has landed HERC servomotor shield will sell 10 units 10 cents each, so production quantities. Atlas E-E Corp. is quoting 25 cents each in lots of 100, 3.6 cents each in quantities of 500,000. Clark Manufacturing Co. reportedly won the Navy competition with a price of 14 cents each.

Collier Corp. plans to sell a complete black JAN shield and base, both machined and wire-wound, for approximately 50 to 60 cents, although firm prices are not yet established, a spokesman tells AVIATION WEEK.

By way of comparison, the HERC Type B shield sells for around \$1.90 (radiating base) in quantities of over than 500, while the JAN replacement Type A sells for around .50 cents in quantities of 3,000 or more.

Notes of Caution

Although the NEL base can be used with existing shiny JAN shields, some observers question whether the re-



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exposed shield temperature will cause a tube softening, varying to line resistance, making it less effective under ambient, shock, and vibration. These observations lead to the conclusion that it is better to replace the JAN shield with a black heat dissipating shield (IERC Type A or black JAN with inert lead), to enable the shield barrier to radiate its heat to the surrounding air.

Collier-Pearson also notes that the addition of the insulation, plus the use of a single circuit de-trapping scheme, the shield is effectively brought closer to the jacket than the JAN. However, since the current is returned, it would be less affected by shield movement than with a standard JAN shield, Pearson believes.

The primary interaction in the field of heat-dissipating tube shields and jackets can best be described as "coupled." IERC is a pioneer in the field. In numerous type tube beliefs that the base jacket (base pinhole) covers the new NEL and Collier type jacket, he came both employ a wider series of conductors hot from the tube to the shield.

The Government recently is filing a patent on the NEL base Collier-Ridge jacket that it has been using commercially since 1962. This jacket provides improved reliability since 1972, and adds that it has filed for a patent.

Additional examples of producers of the new shield jackets include Atlas El-Cap, Bedford Aerop, Bedford, Mass., Bantech Corp., 1517 Valley Blvd., Los Angeles 12, Calif.; Czech Metalworking Co., 1035 S. Halsted Ave., Chicago 26, Ill.; Collier Radio Co., Collier-Kudu, Iowa; and International Electronics Research Corp., 177 West Magnolia Blvd., Burlingame, Calif.

FILTER CENTER SHELL

► **Titan Gets Reliability Treatment.** Titan is relocating its aerospace filter division to one of the most grueling series of heat and reliability imposed upon programs ever attempted for aerospace equipment. Modifications suggested by those who have so supported Titan's reliability effort state: observers believe the tests may end up being among the most reliable requirements in the field.

► **Titan's First VGR—First Canadian** company division has been put into operation at Dorval Airport, Montreal. The VGR, and others to follow, are manufactured by Canadian Autonetics Electronics Ltd.

► **Portable Tensioner Twister.** With more tensioner loading than ever with mobile equipment, field engineers will

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If you are qualified, contact Les Stevenson, Engineering Personnel, Dept. 36, North American Aviation, Inc., Los Angeles 45, Calif. Phone: Oregon 8-3811, Extension 2883.

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1935

BALDUR RESEARCH AND DEVELOPMENT EXPERIENCE with electronic location equipment at G.E. began in 1935 when this first prototype with an output of 150 watts, located planes up to five miles away.

How G.E.'s 20-year antenna background can help make your radar system more effective

6 examples show experience in all areas of land- and ship-based antenna work

To give you an outstanding source for reliable, precision radar antenna equipment, General Electric has developed facilities with the know-how that comes from many years of research, engineering, and manufacturing experience.

For example, early research in electronic location equipment at G.E. began in 1935 and engineering and manufacturing experience includes these six major areas:

1. **Ship/Fixed bases** to cooperate for ship park, real rail were built in large quantity with Navy antennas in World War II.

2. **Small, portable systems** for weather balloon tracking were developed and produced for the Army and Navy in 1941.

3. **Powerful heightfinding antennas**, PPR-50W, developed by G.E. for USAF in 1949, was an advancement in long-range detection.

4. **Giant shipboard search antennas**, largest in use today, was G.E. designed and produced for Navy anti-submarine ships.

5. **Long-range search antennas** (PPR-7) were designed and built by G.E. using advanced construction techniques.

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1955

IN 1955, this huge mobile height finder was designed and developed by General Electric to be used with powerful search radar systems and its major contribution to longrange aircraft location.

Wanted: Flea-Power Communications

The small antenna in which a Northeast Air Lines Convair 1000 power supply after blastoff at a Hubble space station at Boston, depriving the pilot of any communications, points up a need which a little scientific ingenuity could easily solve.

Nearly available high frequency transistors should make it possible to build a tiny transmonolithic VHF receiver, permanently housed in the transceiver (121.5 mc.) channel and containing its own battery supply. Such a unit should not weigh more than a single pound and would take up little cockpit room. It could enable the pilot to obtain information from the ground, as well as maintain his position from ground stations.

At the present rate of only a few years' growth it should be possible to build a compact VHF transmitter also housed permanently in the transceiver and with its own battery, to enable the pilot to radio commands or messages to ground transmitters.

The obvious kind of an acoustic receiver of its position, surface identification lights or communications, as a high density one could be at least partially used with such an emergency VHF equipment.

Meanwhile, a new, portable omnidirectional radio altimeter, General Electric's Model 1000, is a result of a decade of research and development for the aircraft industry. It features a solid state receiver module, omnidirectional receiver, search, open, leakage and constant gain. Total weight of \$39.95, it is available from G.E.'s Electronics Division, Syracuse, N.Y.

► **Hef. Tabor**—Operation Teapot, "the earliest testbed at Yucca Flat, Nevada, caused no ill effects on General



Electric receiving tubes measured from the radioactive rubble, the program reports. G.F. does not say how close the tubes were to the blast.

► **Fir in the Sky** (by L.L. British) initially demonstrated we of its industrial relevance for aerial reconnaissance, with a TV camera and transmitter mounted in a Bellanca helicopter and the picture displayed on the ground. Aboard equipment weighed about 400 lb.

► **Navy Soot Standard**. Cooling Navy Bureau of Aeronautics has solved its surface ripples in come up with recommendations for cooling exhaust modules, with the objective of adopting a "preferred design." For its future equipment, Bureau also hopes to standardize on module sizes for its CN1 [Communication Navigation Identification] pod package.

► **Airlines Eye New Radio Alternatives**. This option to be given serious review among the airlines, particularly concern

canners, for a new improved high-gain directional radio altimeter for use in new jetliners. Present RCA ANQV-5 radio altimeter reportedly is not adequate above 25,000 ft. One engine is selling altitude accurate to within 100 ft. at 45,000.

NEW AVIONIC PRODUCTS

Semi-Conductors

► High-frequency silicon diodes to substitute gallium glass cone, suitable for use in video detectors in 30 to 60 mc IF strips, exhibit fast switching characteristics. Units have low sheet capacitance, averaging 0.5 pfd, high reverse resistance and moderate forward conduction. Bulfin TB-100A gives application data. Same manufacturer



also reports it is now producing silicon power rectifiers with 500 and 600 volt peak inverse ratings, with forward current capacities of 400 amp at 300C. Unit capacity, less than 1-cm dia. in Bulfin TE-1335 gives application data. Transistor Diatherm Corp., Melrose, Mass.

► Silicon NPN grown junction transistors are now available in eight different types in production quantities from a new supplier, Cavalcade Products Corp., a subsidiary of Raytheon

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Electro Manufacturing Co. Type 28101 is a varistor and gas tube unit for military cut 2N101, a general purpose triode 2N102, for high frequency and high power gas and 2N103 for very high current gas applications. Four other models, similar to those described and with the same designation except for an "A" (2N104, etc.), are designed to handle larger currents. Complete units are available by writing company, 53 Jones Ave., Paterson 3, N.J.

• Semiconductor diodes, including point contact transistors, planar transistors, power transistors, photo transistors and silicon junction varistors, previously manufactured by Western Electric only for the Army Signal



Coups will now be available to other government agencies and government contractors. Data sheets are available from Western Electric Co., Radio Div.-Electronics Products Dept., 130 Broadaway, New York 5, N.Y.

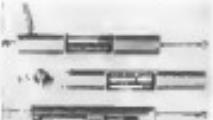
Components & Devices

- Thermal time delay relay, circuit. Bad Dot Series comes in solid construction with oval tube base, in a variety of standard duty rates from 2 to 180 seconds. Standard ratings are 2.5, 20, 50, 100 and 200, c.c. at 125-Volt AC SPST contacts, rated 1 amp at 250 v ac. Other versions open or closed G.V. Controls Inc., 25 Hollywood Plaza, East Orange, N.J.
- New STA-type insulation capacitor employs a solid electrolyte, eliminating leakage and corrosion problems, second



ing. Insulation resistance can be operated at temperatures of -50°C to 85°C, and is particularly stable over temperature. The unit can be used in either liquid nitrogen conventional electrolyte capacitors or high frequency ones. Tantivy Metallurgical Corp., Reeder Capacitor Div., North Chagrin Blvd., 117. Mo.

• Miniature linear pot, with single or dual potentiometers, comes in a 2.5-dia. case. Total length up to 1 in. and resistance up to 50,000 ohms per wick



are available. Each pot has dual wipers and resolution can be as low as 0.005% with single turn type. General Components Co., 565 Eighth St. SE, Minneapolis 14, Minn.

• Potted linear snapback, Model PLS25, provides continuous linear ground current feed with 25 centimeters Center banner provides extra strength and prevents warpage, nonflammable resin. Double snapback is available to provide 40 centimeters. An other model, PLS25, provides two sets of five discrete resistors. Units can



AVIATION WEEK, February 20, 1958

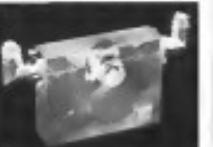
be supplied in a variety of resulting materials. Del-Airtronics Corp., Flushing Sales Div., 4501 Northern Blvd., Long Island City 1, N.Y.

• Film resistor for use in potential-measuring provides essentially infinite insulation.

Device has extremely low friction, a temperature coefficient of 0.0007 ppm/°C, and a resistance value of 10 megohm when dry at 100°C.

Power rating is 1/5 to 2 watts, depending upon size. General Master Inc., 7014 Mayfield Industrial Court, St. Louis 17, Mo.

• UHF-Etron dipole permits operation of UHF communication equipment and tubes derived from a common broadband antenna instead of requiring separate antennas. Features



loss is less than 0.5 db. VSWR is less than 1.5:1, and isolation between channels is 60 db. or more. Unit can withstand 2,000 with peak. Microphone Corp., P.O. Box 1165, Crossville, Tenn.

Instrumentation

Multisystem pressure transducers combine both an absolute and a differential pressure type sensor, each with dual precision output signal systems. Unit reportedly has high sensitivity, readability and repeatability.



Linearity and repeatability are low hysteresis. Fairchild Controls Corp., Components Div., 1725 Park Ave., Heliobilt, N.Y. 10, 611 E. Washington Blvd., Los Angeles 22, Calif.

In 1958 Fairchild introduced with aviation the portfolio series of Chromel-Alumel thermocouples for aircraft temperature measurement. These are the first to measure 1000°F.



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TEN BIG EASY

FOAM PLASTIC lining for leading edge of propeller blade weight and cuts only half as much as equivalent metal lining, according to developer, Curtiss-Wright.

Plastic Fairing Ups Prop Performance

A new form-plastic propeller blade leading edge which cuts and weighs half of an equivalent sheet metal leading edge has been developed by Curtiss-Wright Corp.'s Propeller division.

Flight tests indicate that the plastic leading edge fairings boost Super Constellation cruising speeds by 5 mph and give a better rate of climb.

Fairings are made of a polyvinylidene fluoride plastic weighing about 21 lb/cu ft. They are bonded to the metal leading edge and do not require that prop be re-bored in the factory.

The plastic can be tapered smoothly onto the blade, giving a clean aerodynamic shape. It can be welded onto compound curves and it is self-bonding to the metal surface of a propeller blade.



SHANK CROSS SECTION shows close bonding of foamed plastic to metal. Rugs usually used to anchor sheet metal easily on blade are not needed with plastic fairing.

KLM Royal Dutch Airlines has accumulated 1,700 hours of flying time on the leading installation on its entire fleet of Super Constellation aircraft. Allowing for time lost in reconditioning due to Seaboard & Western Airlines on L1649 Convair and Trans-Canada Air Lines at Super Constellations. Air France's 3619 Super Constellations are expected to be equipped with plastic fairing prop.

The Air Force has ordered full-scale fairings for all C-124G Globemasters and is contemplating a retrofit program for all C-124A aircraft, according to the manufacturer. A prototype plastic fairing is being made for the turbo-propeller-powered Douglas C-133 cargo plane.

New Crash Fire Prevention System Passes First Tests

Code for passenger aircraft drafted for NASA and the Air Force by Walthers Kiddie & Co., Inc., has passed successfully in its second test with an C-33 aircraft. Next stop will be a 100-mile flight test program on two C-119Ps.

Kiddie is also working with Trans-Canada Air Lines on a prototype for extinguishing and cooling fire prevention system for the carrier's Viscount. Cost of such a combination system is estimated to be about 30% higher than a fire extinguishing system.



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SAFETY

CAB Report on Northwest DC-3 Accident

Co-Pilot Shut Throttle on Gear-Up Order

At 1700 U. S. July 21, 1951, a Northwest Airlines DC-3, N-6151, operated as Flight 613, was substantially damaged when it collided with a powerline pole during an attempted go-around at Yakima Airport, Yakima, Washington. None of the 15 crew or passengers were injured.

The flight originated at Seattle, Wash., enroute destination Spokane, Washington with a scheduled stop at Yakima. Departure was from South Terminal Airport at 1700 on an IFR instrument flight rules route via Yakima, Cle Elum, Ellensburg, and Ellensburg to Spokane. The crew consisted of Captain Lauren R. Taylor, First Officer Maurice H. Clegg, Jr., Second Officer Ernest E. White, three crewmen, eleven passengers.

According to company records gross weight was measured at the time of takeoff was 25,541 pounds and the maximum payload capacity was 1,000 pounds. The maximum allowable gross weight is 25,200 pounds.

At 1715 the 613 flight plan was uncanceled and settled DFW (Dallas Visual Flight Limit) and cleared for departure. The flight was advised at 1720, no traffic present west of company routes at Yakima or one mile north of Yakima south of Yakima Airport. Thirty minutes later a second advisory was received reporting low clouds on the west and west beyond the south. Due to this information, 613 turned eastward. At 1739 the flight cleared to the Yakima Control Tower frequency and informed clearance for an approach to runway 22.

When the aircraft was on base leg the tower advised that the wind was south 15 knots. Approach was cleared and the aircraft was then cleared and cleared and the aircraft altered its flight path accordingly. One minute out on final approach (10:00) the flight was cleared of a 1730 foot south wind and cleared to land. At this time the aircraft was cleared to the south of the air port and the ceiling and visibility were well above VFR minimums.

The aircraft descended down in the first quarter of the wet runway, wheel nearly 2,000 feet and started to gear down. From a low altitude of 100 feet the ground just beyond the end of the runway, which a short distance had again become visible. A very short distance beyond this point the right wing struck a powerline pole causing the right engine to fail.

The aircraft continued to fly past above the ground across a hillside, side poles and flew through a small valley, too on the south edge of the hillside. It landed a few feet past the tree and rolled around horizontal until it came to a stop. All passengers left the aircraft unassisted. The right engine failed due to lack of power to the fuel system in the cylinders.

The damage from the approach in excess of 22 ft. in front of 16 was made while the flight

was in enough north of the airport to permit proper runway alignment. A number of persons observed the approach and touch down. The company of these stated the approach appeared to be at a normal altitude for approach into that runway.

All agreed that there was a considerable amount of wake in the headwind block.

top runway at the time of the landing. Runway 16 which was 4,000 feet long, was in good condition and relatively smooth.

'Hydroplaning' Effect

When asked why he took the accident into account, Seale stated the mechanism was an indicated speed of "70 knots on the

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CHULA VISTA AND RIVERSIDE, CALIFORNIA

AVIATION WEEK, February 26, 1956

All claims referred to are Pacific Northwest and are based on the 19-June 1954.



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SAFETY

At runway approximately 1,000 feet from the approach end and 800' before impact, the aircraft was operating with an trailing edge flap set. There was a "ballooning" effect caused by the air passing in the wake on the wing. At this point, the aircraft was level and had a pitch attitude of 10° nose down.

Immediately after触地, flaps were retracted and during the last portion of the landing roll the nose cleared the surface in the sand. After he applied the first 10° of no leading edge, Captain Taylor at approximately 100 feet above the ground, was turned to the right in a turning maneuver at 70 knots indicated airspeed. Further right in the aircraft passed the south end of the series of an obstacle of approximately 15 feet and an indicated airspeed of 75 knots. He called "gas up".

In view of making the gas turn, he applied both rudder and the right rudder pedaling. The captain testified that he then lowered the nose to hold air speed and to apply full throttle. He stated that he did not land immediately after striking the powerline pole because of maximum engine torque problems.

It was determined that the aircraft struck down on its main gear 1,080 feet from the approach end of the runway and that a guidance was started when about three-quarters of the normal length run was used.

The marks disclosed that the aircraft settled in the ground 118 feet beyond the nose gear and until 118 feet below again became airborne. Fifty feet later he noted that point the right wing struck a positive pole and lost altitude. The right wing contact was with a 10 foot high concrete approximately one-half mile further south. The wheels again contacted the ground 51 feet past this tree and the aircraft came to a booked stop after rolling 525 feet.

The right side wing and cabin were substantially damaged. There was a large hole in the left side of the leading edge of the wing fillet. The line of wing struts extended from the leading edge of a panel 14 feet from the top, measured outboard to the bottom end of the skinned fillet of the right wing. This hole was never found to be a normal feature. This condition is confirmed in testimony of the captain.

Previous Go-Arounds

Captain Taylor testified that during most of his career as a pilot for Northwest Airlines, he had flown over this particular route.

He also stated that he had landed at Tolman Airport on occasion 18 consecutive times and remained without passengers. From this information, it was determined the airplane 15 was over high track and power lines and encountered a slight higher than normal approach. He further testified that although the 70 knot indicator was lower than desired for the start of a go-around, he nevertheless elected to go around. He reported that in the descent when he applied power, he heard a "bang" up front.

Father O'Brien testified that he was not informed of the go-around and that the radio he gear up was the only thing and by the captain when power was applied and the gear was stowed.

In assessing the likely series of pulling



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Consider actions travel along in the unceasing flow. Yet no two such their ultimate destination at the same time, by the same route. For who the Past, present and future is a ridiculous determination.

Consider your own Future.

Because you are prepared them using these solutions with which you are endowed. For you, the passage of time creates a level of vision in which your Past, your Present, and your Future are one.

If, however, limitations are continually being imposed upon you, you will find

yourself in your past, your Future is limited by wants and needs, and more than that can never be regained.

Should you be encouraged to use in the future, however, your present problems as one there you are among the future few. Yours is a Future filled with the twin with ambition and method to success.

At Sikorsky Aircraft we take great pride in the achievements of our educated engineers. We do not expect that every second may count for them in their many-activities-a-minute journey to the Future. For anyone who has talents like theirs, we would do all we can.

Please write to Mr. Richard A. Johnson, Personnel Department.



SIKORSKY AIRCRAFT
BROOKLYN, CONNECTICUT
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SAFETY

The first day took his testimony was "At the time the command was given I was in position on side to ensure power and stability as it looked like a crash was inevitable—but the radio came, I started them by transmission later."

The second flight, the left hand was acting as the engine governor but managing the throttle in the general manner. He further testified that he extended the aircraft's altitude for lack of more above the ground when near the end of the runway and at that time he was waiting for the engine's order to reduce power and cut mixture.

Since his arrival in Northeast, Safety First Office Captain had been three months over the State Viking Spokane area with Captain Taylor. He had been discharged in December 1945 and recalled on July 14, 1954.

Mr. Conner had qualified as DC-1 equipped with Northwest Airlines in March 1941 in Minneapolis, Minnesota and had acquired 1,200 hours DC-1 since that time.

Weather Effect

U. S. Weather Bureau records indicate that continuous low pressure systems began to appear in the Pacific on July 15, 1954, near the Cascade Mountain range in western Washington. By late afternoon and early evening a low named Deadwood was reported. There were individual storms of relatively small character during afternoons.

The surface winds accompanying the deadwood were variable in direction and speed. However, due to the localized character of the storm, the winds were at short distances. The storm that passed over the Yakima August 28th, before flight still had the effect of a low pressure system in the northwest, extending from the northwest and was over the field for not more than ten minutes.

The U. S. Weather Bureau at Yakima reported maximum gust of 40 knots during the storm and no windshift was noted. The upper atmosphere was probably unaffected. The surface pressure and leading. The low pressure although held electronically and recorded, continued to descend to just outside the control and coming finally with my aid of 14 miles per hour or more. The U. S. Weather Bureau at Yakima was not recorded. On only precipitation during the storm.

ANALYSIS

A brief thunderstorm was over the airport a short time before flight. G-105 landed dry.

The storm passed 50 miles off shore on the narrow in a very short time but the storm had passed the airport at the time of the landing. The weather was quite variable throughout the entire flight.

Thunderstorms on the first quarter of a mile away, with no resulting landing action created a definite possibility of disaster; therefore the captain's decision to go around appears to be proper. He had made previous arrangements with the landing facility to land even though in no reason to doubt that this would not have succeeded had it not been for the unexpected power inter-

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North American T-28, T-28B

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SAFETY

Report caused by the first officer's action of closing both throttles instead of extracting the landing gear as ordered by the captain

FINDINGS

On the basis of all available evidence the Board finds that:

1. The captain, the second and the crew were properly certificated.
2. The power plant of the aircraft was under the manufacturer's acceptable and the fuel was properly distributed.

3. The engine status was not from recent run which prevented normal testing actions.

4. The captain properly mounted a go-around checklist and completed it correctly.

5. After becoming airborne the first officer landed smoothly, the captain's engine "gave up".

6. Instead of retarding, the gear was advanced by the captain, the first officer closed the throttles and the gear collapsed.

7. The power interruption caused the aircraft to immediately settle to the ground.

8. After power was applied, the second struck a powerline pole.

9. There was no failure or malfunctioning of the aircraft or its components prior to striking the pole.

PROBLEMS CAUSE

The Board determines that the probable cause of the accident was the captain's action in closing the throttles while color rapidly receded to the overall striking a powerline pole.

By the Civil Aeronautics Board
Evan Roberts
John F. Adams
Bob Lee
Chris Gammie
Homer D. Depp

SUPPLEMENTAL DATA

The Civil Aeronautics Board was notified of the accident by Northwest Airlines Dispatch Office, Seattle, Washington, at 0100, July 17, 1975. An investigation was soon started and it was determined that the captain was issued "Reg. 101 or 111" of the Civil Aeronautics Act of 1940, as amended. A special investigation was initiated by the Board and depositions were taken at Seattle, Washington, on August 2, 1975, and at Yakima, Washington, on August 4, 1975.

Air Canister

Northwest Airlines Inc., a corporation in the State of Minnesota and maintains its principal place of business at Minneapolis, Minnesota. The company operates a number of aircraft, which are registered and maintained by the Civil Aeronautics Board and are carries operating certificate issued by the Civil Aeronautics Administration which is within the coverage of present property, trial and trial test described in the report.

Flight Personnel

Captain Loren E. Taylor, age 41, was employed by Northwest Airlines as a pilot in 1963. He holds a valid commercial certificate with an instrument rating and type rating for DC-10 aircraft. Captain Taylor has, according to company records, a total of 7,118

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This Johns-Manville Goetze gasket was used in a pneumatic ducting system installed on the fuselage of the Boeing B-52's wings. Considering a system that must work with an aluminum skin, it is remarkable that the Johns-Manville Goetze seal is so reliable. Long life and Boeing selected Johns-Manville gaskets only after extensive performance tests.

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PRODUCTS FOR THE
AVIATION INDUSTRY

SAFETY

plot hours, of which 2424 were assigned to DC-3 equipment. His DC-3 check record was never exceeded. He died on June 11, 1951.

First Officer Charles H. Clegg Jr., age 30, was replaced by Northwest Airlines as a pilot in 1971. He had a valid commercial certificate with commercial pilot, single and multi-engine land, instrument and flight instructor ratings. Mr. Clegg had a total flying in company records, a total of 1,400 pilot hours, of which 1,336 were assigned to DC-3 equipment. His last fatality physical examination was passed on September 16, 1954.

Second Officer Eleanor E. White was employed by Northwest Airlines on December 3, 1954. Her DC-3 check rating was January 26, 1955, and March 10, 1955, were graded as satisfactory.

The Aircraft

N 45131, a Douglas DC-3 serial number 4156, was owned by Northwest Airlines, Inc., and was manufactured on December 3, 1942. It had 17,195 flight hours when the accident occurred.

The aircraft was equipped with Pratt and Whitney R-1830-42 engines and Hamilton Standard model 21E50-471 propellers. Total on both engines and both propellers time overhauled was 791 hours and 991 hours, respectively.

Signal Tells Pilot When to Feather

Sabathur is an electronic power fail-safe indicator which operates on the torque principle to flash a red signal indicating the correct propeller to feather.

The equipment's torque sensing unit is attached to the engine's engine mounts.

The manufacturer points out that when an engine is idling power, the sensor is subjected to a bending load; as the amount of power, the load is reduced. Sabathur ratio the sense of torque and actuates the cockpit signal.

Weight for a two-engine installation is less than 4 lbs. and installation takes less than one day. The manufacturer is submitting a reduced lot for applicable types of aircraft to Civil Aviation Authorities for approval.

The maker is Allied Technical Manufacturing Corp., 3245 Tuxedo, Houston 17, Tex., an instrument manufacturer and subcontractor firm.

Spanish Airline Orders Five Convair 440s

Iberia, the Spanish airline, has ordered five Convair 440 Metropolitan for use on its continental routes out of Madrid. The order, scheduled for delivery about a year from now, brings the total number of Metropolitans ordered to 74. The first Metropolitan off the production line was delivered last week.

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The Year Advertising Helped

Kill a Business Recession

IN 1954 we had a business recession in the United States. Sales fell about 4% during the year. If management had followed the historic pattern of business up and down, advertising volume would have fallen much further.

But in 1954 the volume of advertising did not fall. It increased over 2%. Every effort was made to stimulate sales while sales were needed to sustain prosperity.

This was something entirely new under the sun. It had a powerful influence in making the recession of 1953-54 one of the mildest on record. It helped greatly to speed business on to the record-breaking levels it has attained today.

There are several reasons why America's business management attacked this decline in sales with more advertising. One of them grew out of the greatly strengthened position of the defenses consuming market. Consumers' income after taxes has been rising at average of over \$10 billion a year since 1946, and this rising income is more widely distributed than ever before. Furthermore, consumers have piled up reserves of about \$215 billion in cash or ac-

equivalents. These reserves offer a new and powerful incentive to increased selling and advertising, often even in the face of a possible decline in consumer income.

Taking the Longer View

However, the principal reason why a sales decline was attacked with increased advertising is management's new-found conviction that good advertising is essentially an investment in the development of a market. Successful development requires sustained government. The inclination of business management to take this longer view, is, of course, motivated by the fact that the American market, with over 3 million consumers being added annually, is growing at a prodigious rate.

Ten years ago only a handful of companies had plans for investment in new producing facilities extending beyond the current year. Today almost all leading companies have investment programs running some years ahead. And keeping pace with these long-range business investment plans has been the development of sales and advertising programs to

reach tomorrow's greatly expanded markets.

This crucial role of advertising in providing driving power for our economy is gaining greater recognition every day. In his recent book, "People of Plenty," Professor David M. Potter of Yale University remarked: "Advertising is not badly needed in an economy of scarcity, because total demand is usually equal to or at excess of total supply, and every producer can normally sell as much as he produces. It is when potential supply exceeds demand—that is, when abundance prevails—that advertising begins to fulfill a really essential economic function."

Advertising's Key Role

Today abundance so completely prevails in the United States that it has been conservatively estimated that as much as a third of everything offered for sale falls in the realm of "optional consumption." That is, consumers can "take it or leave it" without any immediate personal inconvenience. But if they decide to "leave it," a terrific economic depression will not be far behind. In such circumstances, advertising—is

which, in all of its forms, we are now investing about \$9.2 billion annually—clearly is of crucial importance to our continued prosperity.

In performing its key role in past years, American advertising never realized its full potential. It successfully promoted sales, but it never was called upon to promote to overall economic stability as a direct outgrowth of increased sales.

By successfully promoting both sales and economic stability, as it did in 1954, advertising surely has added new strength to the American economy. It has also added a great new and constructive dimension to advertising itself. That accomplishment makes the celebration of our first National Advertising Week (February 19-25) a particularly notable occasion.



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One of the newest sources of expanding your sales volume in today's \$150 billion industrial market is through domestic advertising in the publications directly serving your major customers and prospects.

McGraw-Hill's business and technical publications can give you quick access to the men who initiate, specify and approve the purchases of industrial products and services. Because all are leaders in their respective fields, you are assured a maximum return on your investment when you specify a McGraw-Hill publication to carry your advertising to your most important markets.

Allegheny Pleased With Martin 2-0-2s

Low cost, successful operation, public acceptance convince carrier plane now is ready for heavy duty.

By Craig Lewis

Washington—Allegheny Airlines, the third local carrier, seems to use the Martin 2-0-2, is exceeding all its first year of operation with a record profit and preparing to expand its Martin operation.

After some difficulties and disappointments during the first months of Martin service, Allegheny thinks the collector rock is indeed solid. In January, the average load on the Martins was 35.4 while the DC-3 average was 9.6, compared with a DC-3 average load of 9.8 in January of 1954.

The expansion in Martin loads is more encouraging because of the increased load and another condition in January. Operating passenger load for the month was 81.8 percent of the 96.4 miles for the previous month. Allegheny expects the Martins to be operating at 100% when load factor plus the 90% mark and the first year of expansion begins to pay off in operating savings.

Allegheny bought its first four Martins last spring and has operated them on some of its lighter routes to gain experience and develop staff skills. Last month, two more Martins were added to the fleet which includes 14 DC-3s.

Passenger Load Grows

One of the original Martins was lost when an engine caught fire on a trans-Atlantic flight. Damage was so extensive the airline decided to replace the plane rather than repair it. Thus Allegheny wound up with a total of five 2-0-2s for a little over \$1 million. Barnes and the Martins provided a sharp modern plane to supply a pressing need for new seats.

Mixed Fleet Continues

Allegheny doesn't yet expect to have as all Martins operating. Some points on the current status bear repeating. The report indicates we're 6% to capacity anything but DC-3 operating. Until an efficient replacement for the

DC-3 is available, Allegheny will use a mixed fleet, and Barnes predicts that in the near future there'll be a single-airplane fleet for local routes because of their characteristics.

The Martins were bought by Allegheny in a front-loaded effort to provide for business growth while a replacement for the DC-3 is developed. The airline feels that the addition of the 2-0-2 will allow it more time to look at the DC-3 replacement and wait for them to prove themselves.

Barnes points out that both the Thunderbird F-7 and the Blandford Flying Boats are potential replacements that have prototypes flying, or at least two years from actual operation. Both look attractive, he says, but that are both economically expensive. According to estimates, suitable costs of the Martins 2-0-2 are better than either the F-7 or the Blandford right now, Barnes said.

A DC-3 replacement will have to go to a scheduled operation, Barnes feels. He agrees with the general opinion that the local airlines will never get out of subsidy unless they are forced to use the DC-3.

CAB Support Needed

In order to get off subsidy, the local airlines are going to have to spend substantial amounts of money, and that will need the support of Civil Aviation Board policy to do it, according to Barnes. He feels the CAB will have to shift its policy on underwriting local airline activities before the carriers will be able to take advantage to acquire a replacement for the DC-3. This would amount to an investment of approximately \$100,000.

The CAB has previously refused to spend any extra money to help a frontier line move to its using modern equipment. When Frontier Airlines re-equipped with the Martin 2-0-2, the Board turned down a request for extra subsidy to underwrite the costs. Frontier shifted back to the smaller DC-3 and eventually merged with Continental Air Lines.

Southeast Airlines has had more luck with the switch to Martins, although the CAB said it would not approve the DC-3s only to cover traffic between Atlanta, La., and either the Martins and Memphis. Atlanta's Convair 240s, Allegheny's new transports are steadily a management aid, and the Board hasn't said it will provide any financial help.



AFTER INITIAL difficulties, Allegheny is ready to place its 2-0-2s on heavy-duty runs.

Allegheny Airlines

Average Passenger Loads

	1954	1955	1955	Cost
	DC-3	DC-3	2-0-2	per mile
July	11.9	32.6	15.2	13.1
August	12.7	32.1	14.2	12.9
September	11.6	32.6	16.5	13.5
October	11.3	31.9	14.9	12.4
November	10.8	34.4	15.5	13.5
December	9.1	34.8	16.0	13.5

Curtis Takes White House Post To Tackle Nation's Air Problems

By Pebble Stover

Washington—Edward P. Curtis takes office next week as Special Assistant to the President for Aviation Facilities Planning, a position which was recommended by the Budget Bureau's Aviation Facilities Study Group headed by William Stanley Blodgett (AW, Jan. 16, p. 20).

Curtis has been spending the time since his appointment on Feb. 13 in consultation with Blodgett and other members of Blodgett's study group. He has also visited with the Secretaries of Commerce and Defense, each of whom is a chairman of a top-level departmental committee to work for Curtis in a liaison capacity.

Initially, Curtis is expected to work with a small permanent staff. He may later ask for the assistance of an ad-hoc board, which was suggested in the Blodgett report.

The President's action in expanding Curtis represents full endorsement and direct implementation of the Blodgett group's recommendations.

The group had stressed the need for the Air Force high-level leadership to direct a continuing long-range study to assess just an integrated aviation facilities development program, prompted by dangerously imminent air traffic congestion.

Senate Unanimously Passes Sabotage Law

Washington—Legislation authorizing the death penalty or life imprisonment for sabotage of commercial aircraft is falling in a Senate bill passed unanimously by the Senate.

Introduced by Sen. Warren Magnuson (D-Wash.), chairman of the Senate Select Committee on Small Business, the measure also provides a penalty of \$10,000, or 15% fine imprisonment or both, for (1) an act of sabotage which does not result in a death, and for (2) false information intentionally supplied, concerning an attempt being made at commercial aircraft sabotage.

The cork of a United Air Lines plane shot down over Tall in a series of a bomb placed in a passenger's baggage, which caused 44 deaths, found attention on the need for the legislation.

Sen. Earle Clements (R-Ky.) pointed out that airlines have a difficult job in not adequately cover terrorist sabotage or do what possible protective measures with the issue.

"I am taking this action," he said, "because the rapid technical advances in aviation and the remarkable growth in the use of air transportation have complicated the nation with serious aviation facilities problems."

"Modern aircraft can be operated in



Edward P. Curtis, newly appointed Special Assistant for Aviation Facilities Planning, a post created by President Eisenhower. The 39-year-old Eastman Kodak executive is a long-time friend of the President. He served as a major general and chief of staff of the Strategic Air Force during World War II under the command of Gen. Carl "Foxy" Spaatz. He holds a private pilot's license and was a model pilot in the fast World War II fighter planes. As a director of the Air Power Review, Curtis is a director of the Air Power Foundation.

the numbers required by the national defense and the civilian economy, only if safety, navigation aids, air traffic control devices and communication systems are suitable for their needs."

Maguson, anticipating further increases in air traffic, the introduction of jet propellers for civil as well as military aircraft, the advances being made in jet fighter flight, and the greater use of larger aircraft, of greater weight, heavier forces demands upon air fields for navigation and traffic control, the President said.

Top Level Cooperation

A comprehensive aviation plan should provide the basis for these accomplishments:

- Timely establishment of technically adequate aids
- Optimum coordination of efforts of the civil and military aspects
- Avoidance of costly duplication of systems and equipment
- Effective cooperation by state and local authorities and aircraft operators in meeting highway requirements.

To delay the formulation of the plan is to invite further congestion of



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Amphibious... Deluxe cabin interior... High cruise and top speeds



Canadair's Maritime Brittanica

Proposed piston-powered version of British Britannia turboprop transport being developed by Canadair Ltd. as a military reconnaissance aircraft is shown in sketchy details. Aft from the piston engines, which will replace the conventional Britannia turboprops to provide longer range at low altitude, changes in design include a large cargo door under the nose and a stagger rod to locate Magnetic Anomaly Detection gear.

the response, needless travel, downtime, inconvenience to users and waste of equipment of the national service," President Eisenhower said.

Carter has been assured by the President that he will have the cooperation of both the Department of Commerce and Department of Defense—but not control by either of them. These two and all other agencies concerned with air traffic control will be Carter's principal assistants to be carried out his assignments.

The President told Carter these standards exist with the Government, "a wealth of experience, much of which should be helpful to you." Carter was authorized to call upon any official of the Executive Branch for assistance Furthermore, President Eisenhower said, "I shall expect that from time to now on we will keep you apprised of our progress and that you will promptly advise us of anything that I might do to expedite your work."

FHA, VA Reassured On Jet Noise Problem

Washington—Airline and airport industry representatives have presented an optimistic picture with regard to future jet transport noise and revenue problems, in contrast to pessimistic predictions made by industry leaders at the recent Air Conference here (AW 12c, p. 51).

The proposed version of what will happen when present jet transports are introduced came at a joint conference here between airline and industry

executives and officials of the Federal Housing Administration and Veterans Administration.

FHA Commissioner Eugene P. Mason and the aviation experts concluded that development of civil jet aircraft probably will contribute no great change in the use or location of present airports nor in the aircraft noise factors in airport operations.

Similarly, FHA officials were apprised about the anticipated impact of jet aircraft on noise levels in urban areas because of their ability to move passengers more rapidly and efficiently than conventional aircraft. Mortgages run up to 30 years duration, and FHA and VA started a long-range forecast.

The industry experts told Mason that "noise suppression programs to date give every indication that jet transports will have outside noise characteristics comparable to present piston engines."

Mason and his staff also stressed that the impact of the future is not going to be too much different from today, although for a period there may be an expansion of noise.

As a result of the statements, Mason said, FHA will attempt no major jet noise revision of its mortgage insurance policies for houses near airports.

FHA and VA are to be kept informed on noise research by the industry as well as the Civil Aeronautics Administration, which also was represented at the joint meeting. Other participants included Airport Operators Council, Air Transport Ass., Aircraft Industries Ass., and the National Air Transportation Coordinating Committee.

Civil-Military Radar Use Studied by CAA

Washington—Problems of joint military use of air defense radar information for air traffic control purposes were under active study by the Civil Aeronautics Administration and the Air Force.

A two-and-a-half year evaluation program sponsored by the Air Navigation Development Board gets underway next week. It is being conducted by CAA's Technical Development and Evaluation Center at Indianapolis in cooperation with the Commercial Air Defense Command at the latter's radar installation at Radial City, Ind.

The evaluation will determine and test possible methods for CAA use of ADC radar for air traffic control with out compromising the primary mission of the air defense equipment. A bi-part program will start with the performance of equipment in meeting the defining requirements of air defense and traffic control by testing the accuracy of air radar information to the traffic control center.

Initially, CAA and the Air Force are issuing flight instruction checks of the Radial City ADC mode. This is intended to draw data to usage and recommendations required as to traffic control. Flight checking will be done at both low and high altitudes. CAA control from the Indianapolis Air Route Traffic Control Center will control a portion of the air from the Radial City installation, maintaining contact with the ADC CC.

The second stage of the study, beginning in June, will be the first test of a 10-mile microwave link for receiving radar information from the Radial City ADC to the Indianapolis ARTCC. The round-trip travel time tests are expected to extend over a two-month period.

Permanent Routes Asked For Alaska, Hawaii Lines

Legislation directing permanent certification of routes Alaska, U.S. Alaska, and Hawaii airline operations was introduced in Sen. Wayne Morse's (D-Ore.) chairman of the Senate Commerce Committee.

The two senators would have the effect of providing permanent certificates to Pacific Northern Airlines, Alaska Air Lines, Hawaiian Airlines and Trans World Airlines. One bill stipulates permanent certification for U.S. Alaska and Trans World Airlines operating under temporary certificates who make eight trips within 120 days after enactment. The other stipulates permanent certificates for U.S. Alaska airlines applying within 120 days, provided service has not been "inadequate and inefficient."



SAFE FLIGHT LIFT INSTRUMENTATION STANDARD ON VISCOUNT SERVING LEADING NATIONAL & INTERNATIONAL AIRLINES

SAFE FLIGHT stall warning equipment is particularly important on these turbo-prop planes. SAFE FLIGHT has also engineered a valuable Speed Control instrument system—available for all aircraft—providing the flight crew with continuous wing lift ratio data. A panel-mounted indicator offers the pilot an accurate reading to maintain stable flight...especially significant for turbo-jet aircraft at the high lift coefficients encountered in take offs, approaches and landings.

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WHITE PLAINS, NEW YORK

Appeals Court Upholds CAB on Surface Mail

Washington—The right of the Civil Aeronautics Board to allow cargo air lines to carry surface mail under its express authority has been upheld by the Court of Appeals.

In a split decision, the U.S. Court of Appeals for the District of Columbia supported the CAB's decision to let Air Astana, Flying Tiger Line and Braniff Airlines take part in the Post Office Department's program of carrying surface mail by air.

The majority opinion finds that the Board can exercise an "aerial" or "airmail" authority as exemption power. In the case of the three air cargo airlines, which aren't certified for mail, the Court agrees with the Board that national manufacturers' power exemption authority for participation in the surface mail experiments.

These cargo carriers have available space on which surface mail may be carried, the Court said in its majority opinion written by Judge Walter M. Blockley. "The Postmaster General does this service on an experimental basis."

The experiment appears to be limited to a reasonable time.

"Certification proceedings on either a passenger or an express basis could not be completed in time to enable the cargo carriers to participate in the experiment." We think there are "several circumstances affecting operations with the unknown meaning of the term."

In a dissenting opinion, Chief Judge Ernest W. Fidgeron maintains that the experiments involved are not warrantable under the Post Office Act. The court says it does have said that "adequate experiments may be held, we cannot assure" affecting all "unanticipated" areas," he said.

"It seems to me to follow that there are not 'several circumstances affecting the carriers' the Board has no excepted. Moreover, there are not circumstances affecting the 'operations' of the carriers. For those who still may say I think the Board exceeded its authority in granting the exemption," says Fidgeron.

Engine, Pilot Cause Cessna DC-3 Crash

Washington—In a crash of a Cessna Air Transport DC-3 was killed by engine failure and failure of the pilot to make his emergency descent while attempting to make an emergency landing according to a Civil Aeronautics Board accident report.

The accident occurred at the Lockheed Air Terminal in Bethesda, Md., last

last September when the DC-3 developed engine trouble after takeoff and became uncontrollable. The crippled plane was cleared for an emergency landing, but it failed to align itself with a runway as making its approach.

Approaching at a maximum altitude, the DC-3 struck a power line, stalled and crashed into the two Air Force C-146 parked on the field. The DC-3 then careened, skidded along the ground and crashed into a Lockheed transport freighter.

The pilot and copilot and an engineer were hospitalized for minor injuries. No fatalities resulted.

Investigation revealed a serious engine malfunction which occurred after takeoff.

The probable cause of the accident according to the CAB report is the pilot's receiving erroneous information to a landing altitude index or visual cue densities of his aircraft's elevation for landing engine failure immediately after takeoff.

Slick Airways Cancels Lockheed 1049H Order

A Slick Airways order for three Lockheed 1049H Super Constellations by freighters has been canceled, Lockheed Aircraft Corp announced last week. Slick recently bought three Douglas DC-6A cargo planes from Air West Ltd., following the British company's bankruptcy from the Atlantic air line.

The DC-6As, which were owned and available until Slick's original order for increased capacity, will be used for increased capacity. The 1049Hs were scheduled to be delivered in 1957.

Braniff Begins Flights Over New Eastern Route

Braniff International Airlines has put inaugurated service into its newly awarded route to the Northeast (AW Nov. 28, p. 12). Initially, the Dallas-based carrier is offering three daily round-trip DC-6 schedules between Newark Airport and Dallas. Two of the flights will be first class, and one will carry air mail en route between Newark and Dallas. The third schedule is a night coach.

CAB Orders

Rule 2(h)(3)

GRANTED

Leave to intervene in the State of Ohio in the case involving transfer of Title of the Cincinnati, Louisville and St. Louis Railroad to the Louisville and Nashville Railroad Company, Louisville and Nashville Railroad Company, the City of East Toledo, and the Board of Commissioners of Lucas County.

Applauded for exemption authority for service to Idaho. Rule 2(h)(3) granted for Title of Central, Atlanta, Investor, Atlanta City of Lakeland and the Lakeland Chamber of Commerce, the City of Lakeland, the State of Florida, the State of Georgia, the State of South Carolina, the City of Columbia, and the Board of Commissioners of Columbia and Marion for permission authority for the service of air travel for leasing.



Jet-to-jet refueling at 500 miles an hour

The Boeing jet tanker prototype is just above making a refueling contact with an eight jet B-52 bomber.

This operation is part of an intensive test program in which every detail of America's first jet tanker, the Boeing KC-135, will be proved out well before the first production model rolls off the line.

For more than a year the Boeing prototype has been accumulating the kind of data obtainable only in aerial flight. Test flying developments and design refinements have already been incorporated in the KC-135s now taking shape in Boeing's Seattle, Washington, plant.

Besides proving out the airplane itself, the prototype makes it possible to see firsthand the streamlined new Boeing Flying Banjo, and all aspects of zero-to-jet refueling at speeds above 500 miles an hour, and altitudes over 35,000 feet. This means that when delivery of the KC-135 to the Air Force begins, the airplane will be operationally proved. And it will be equipped with a flight-tested jet-to-jet refueling system.

The prototype has, during thousands of hours of ground and flight testing, performed beyond expectations. This is just a result of Boeing's unique experience de-

Airline Traffic—December 1955

	Total Revenue Passengers	Revenue Passenger Miles (\$000)	Load Factor	Q.S. Avail Ton-Miles	Revenue Available	Freight Ton-Miles	Total Revenue Ton-Miles	Per Cent Revenue to Available Ton-Miles
DOMESTIC								
American	503,657	341,963	68.6%	8,089,571	7,115,404	64,212	4,289,418	62.5%
Boeing	1,998	18,000	74.2%	12,200	11,200	1,100	1,100	91.17
Contin	79,269	60,000	58.4%	583,316	583,249	384,415	7,003,233	49.03
Copa	35,242	7,344	47.3%	10,126	8,150	34,634	79,074	49.03
Continental	51,891	18,951	56.7%	58,508	35,154	133,798	7,081,958	43.09
Delta	153,218	75,850	68.0%	370,473	370,473	68,658	7,837,761	57.38
Eastern	513,526	309,979	53.4%	1,734,764	984,218	1,476,213	19,314,764	43.88
National	152,242	77,145	77.1%	1,111,741	1,111,741	1,111,741	1,111,741	100.00
Northwest	99,003	5,038	58.1%	75,738	54,495	83,776	50,245	53.88
Northwest	89,479	40,344	51.6%	50,478	58,518	789,521	7,045,964	94.44
TwaWorld	360,398	244,446	65.8%	5,485,536	5,485,536	8,688,504	58,375,108	59.41
United	404,091	310,363	60.8%	3,057,453	1,854,451	33,318,924	55.68	
Western	84,071	41,551	59.8%	354,790	353,029	893,154	6,649,472	55.58
INTERNATIONAL								
Aerolineas	9,072	6,770	41.5%	14,717	548	243,412	915,838	64.89
Braniff	3,183	1,897	36.1%	42,581	91,145	105,595	30,611	
Caribbean Atlantic	12,416	984	58.5%	1,965	4,189	95,758	52.19	
Continental	1,061	1,894	48.8%	160	6,480	1,405	6,480	46.25
Delta	1,071	1,071	74.1%	1,070	1,070	1,070	1,070	100.00
Eastern	70,018	78,668	46.3%	133,798	133,798	184,470	849,206	58.47
National	6,016	5,963	58.2%	72,048	3,989	45,336	54,206	61.39
Northwest	8,795	16,701	58.6%	7,587,647	83,483	549,102	4,204,829	79.89
Pan American	4,370	5,841	43.3%	65,475	298,880	1,408,801	54,440	
Aeroflot	55,926	75,140	40.0%	1,071,400	8,744,388	17,762,799	48,98	
Pan Am	70,644	34,795	63.8%	1,000,934	7,289,818	8,831,365	66.81	
Latin American	97,796	82,025	39.0%	311,337	3,495,319	18,021,008	59.93	
Passey	77,487	13,817	41.5%	50,889	50,889	1,795,359	1,795,359	54.56
TwaWorld	54,203	36,317	58.7%	5,485,536	5,485,536	130,560	6,195,211	67.69
United	5,216	14,598	55.5%	190,995	46,140	1,729,955	73.54	
LOCAL SERVICE								
Allied	34,410	4,029	40.8%	93,319	80,487	494,414	43.40	
Braniff	8,364	3,878	35.0%	3,301	8,466	3,348	192,080	32.19
Contin	3,461	1,090	35.8%	2,038	3,324	4,006	136,518	58.59
Frontier	12,504	3,509	41.5%	50,468	9,067	40,557	41,155	58.85
Lake Central	3,170	1,379	41.5%	2,412	9,149	1,349	1,349	55.88
Midwest	24,463	4,247	38.8%	18,741	18,741	9,176	9,176	58.78
North Central	34,798	3,771	44.3%	87,389	34,481	316,240	41,64	
Okla	20,208	3,209	33.4%	20,210	17,757	21,712,13	34.68	
Piedmont	15,595	5,909	55.5%	29,558	14,911	56,392	60,247	58.74
Southern	13,995	8,493	46.5%	13,534	13,513	85,815	85,815	59.46
Southwest	13,019	12,700	48.0%	12,700	12,700	16,714	16,714	52.53
Twa Texas	18,869	8,309	51.4%	86,990	8,184	70,079	70,079	56.76
West Coast	14,513	8,048	46.1%	7,790	3,027	3,297	31,850	49.95
HAWAIIAN								
Hawaiian	21,945	4,830	59.7%	7,150	135,178	395,701	33.38	
Twa Pacific	14,118	5,768	48.8%	9,098	70,446	74,112	48.98	
CARGO UNITS								
Airlines Served Americas	—	—	—	—	—	—	—	—
Riding Tiger	—	—	—	—	—	—	—	—
Black	—	—	—	—	—	—	—	—
Rediff	—	—	—	—	—	—	—	—
	—	—	—	92,075	4,414,056	4,445,071	46.68	
HELICOPTER								
Marine Corps	2,349	53	71.4%	1,373	1,204	478	3,349	56.80
Los Angeles Airways	7,137	91	55.1%	50,830	3,894	5,179	58.58	
Helicopter Air Service	—	—	—	—	—	—	6,937	81.79

Compiled by AVIATION WEEK from airline reports to Civil Aeronautics Board.

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of the most powerful large liquid-propellant rocket engines in the Western World. Rockwell is also designing, building, and testing many other types and sizes. For the future, it is carrying on research for even more powerful and startling rocket engines.

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*Rockwell's North American rocket engine division. It has just moved into new ultra-modern laboratories in Canoga Park, located in the beautiful West San Fernando Valley of Los Angeles. This area is famous for its fine residential sections, modern shopping-center convenience, varied commercial and entertainment facilities. And just to the east are the mountains that provide drive from the beaches, and the weather is pleasant all year round. Many engineers are recruited in advance, including alumnus of UCLA, only 15 miles away from our laboratory.

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North American Asks Congress For Help in Fight for Low Fares

Washington—North American Avia-

tion Group pleaded for congressional support in its fight to prevent the Civil Aeronautics Board from increasing fares to the Moon. Congressman Solonethon of Aviation headed by Rep. Chet Theriot (D-Ala.)

James T. Ingelmann, chairman of the committee, declared that a thorough congressional investigation and action is urgently needed to use the law, as it exists, first, price regulation's companion in air transportation. The 12½% sales tax now levied on the total business is calculated to wipe out the only surviving competitive spirit regulating low-cost domestic and international air travel for the public.

Other witnesses testified to the inappropriateness continued study of cost.

*L. C. Bussey, vice president, Flying Tiger Line, who proposed legislation to eliminate Civil Aeronautics Board's compensation authority which makes it possible for the Board to pamphlet appear air operations without the requirement for a certificate of public convenience and necessity.

*K. McMenamy, executive vice president, Air Line Pilots Assn., who urged that contract fares be regulated to the same degree as established basic and regional establishments of an independent airline industry.

McMenamy also asked CAB seriously to re-examine civil penalties for the filing of schedule scheduling representations so well over two years without effective enforcement of antifraud actions being taken by the Board. "We have

McMenamy declared that pilots, dispatchers, cabin management and the public are exposed to serious danger on air flights.

Brownell told the committee that if legislation were passed amending the Board's exemption authority, "We could have a competitive market in the event of an emergency with no federal regulation." He pointed out that both the airlines and local service airfares互相爭取 each other through the exemption authority.

Ingelmann maintained that "If Congress fails either that competition is allowed to survive, or if airfares as now exist should be able to cover the U.S. in flight hours for \$50 and fly to Europe for about five hours for \$100."

The spokesman, moreover, Rep. Harlan and Rep. John Bell Williams of Miss. (D) also applied North American Aviation's position of levying taxes proportionate to operating costs at an amount of 12½% and the requirements

of the 1951 Civil Aeronautics Act.

Williams called on President Johnson.

"Whatever the North American Aviation Group has done length, as negligible I think, the fact of itself, is a good indication that we have made a very distinct contribution to civil aviation in this country."

"That in itself does not necessarily justify the Board in granting every thing you are asking. However, I think you are entitled to some consideration in that account."

Fairchild, Civil Aeronautics Board and Air Transport Assn. (AW) Jan. 28, p. 1051, Commerce Department and several other organizations (AW, Jan. 28, p. 105) have appealed before the Subcommittee.

London Will Construct Elevated Air Terminal

London Heathrow is scheduled to begin this month on a downtown site to construct what will result upon a steel and concrete platform 25 feet above a major railway junction on the western edge of the city. Present plans call for the completion by 1968.

The 75,000 square-foot, 3,500-ton platform will be supported by 88 short columns, each in a triangular site between the adjacent railroads. Administration offices, shops, a restaurant, parking lot and other features will be included in the development.

Since British European Airways has surveyed the existing Waterloo Air Terminal will require next year, a temporary terminal will be opened on the platform.

London Transport, the municipal transportation company, will be turned over to Air Transport Ltd., an organization formed for the purpose by BEA, British Overseas Airways Corp. and the Luton.

Shortlines

*Atlanta, the Italian airline, will start the first direct service between Vienna and London on April 1 with Convair equipment.

*British Overseas Airways Corp. says that its traffic between New York and Brussels tripled in January, compared with January, 1955. The British firm has carried 821 passengers last month and 218 in the previous January. Currently, the carrier operates a daily Super-

Constellation transatlantic service and three Viscount first class flights a week to Britain.

*Colombia's government is negotiating with private interests for helicopter services to the country. The administrative tasks of the country's present problems is helicopter transportation. It also gives air transportation a vital advantage with the very slow land transport.

*Continental Air Lines has taken up options on three Viscount 810/840 transports, issuing an initial order for 15 and total Viscounts sales to 277. Continental is taking an option on another six Viscounts.

*Cebula, the Cuban airline, has bought three Viscounts for delivery this year and will receive two Super-C Constellations in April. The Viscounts will replace Convairliners on the Havana/Mexico City route, and the Super Constellations will be between Havana and New York and on the Mexico/Mexico/Madrid route.

*Delta Air Lines and Southern Airways started a radio and newspaper campaign the month of 12 cities served by South to promote ensemble traffic between the two carriers.

*Garuda Indonesia Airways plans to expand operations in the Far East and will have several medium-range transports in the United States and Great Britain. The west coast route for the Indonesian airline is reported to be service between Jakarta and Hong Kong via Singapore and Bangkok.

*Hong Kong Government has issued five-year licenses to Macao Air Trans., South Hong Kong Airways, Ltd., and South Pacific Airways, Ltd., Nov. 1. All three are to receive 100% of FEY revenue to Macao, and Far East Kisan Airways Inc. DC-4 service to Jakarta. Cathay Pacific is authorized to operate between Hong Kong and Shangai, Manila, Calcutta, Bangkok, and Singapore.

*Latin American Airways affiliate of Pan American World Airways, has started a weekly nonstop service between Puerto Rico and Puerto Rico with Convair equipment.

*Pan American World Airways flew 687,201,000 passengers in the fourth quarter of 1955, compared with 592,295,000 passengers for the same quarter of 1954.

*Trans World Airlines is distributing a Guide to Hotel Facilities for Business Meetings and Conventions to various organizations to help them plan their meetings and conventions.



SERVICE SCHOOL INSTRUCTORS

The world's pioneer helicopter manufacturer has openings for two instructors in its maintenance school. High school or trade school preference may qualify if they have had several years of maintenance experience in later day helicopters. Minimum experience in service maintenance would be helpful but is not a necessity and those having limited experience for instructing others also preferred, but not required. See A & E Boxes.

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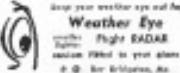
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LETTERS

The Airpower Fraud

The reutilization of tanks. We are now in need of armor maintenance and storage in the USAF should not be considered as greater backlog and quick for gains. It should done soon, implemented that its time, transportation of tanks may still continue. We think, in buying and ready for the delivery of them.

9. In "Some Strategic Issues about the Future Availability of the IAEA at the IAEA," the USAMF is undoubtedly to reflect upon the top concerns—the procurement agencies of the USAMF, the procurement agencies and the weapons industry in a week.

This problem is not a new one. It has plagued support for years. With a series of past test fits of the right space parts are produced. Then after an inspection fit, data are taken to measure a plane from the ADCC states are logged down to the real tape of 10 million space parts which are tested. Parts produced from this plan, manufactured or emergency TWA orders are also allowed to be issued down. In most cases, consideration

Learned that lesson in World War II but
I seem to have forgotten it.

If it is important for us to have a strong defense, it would be better to obtain better training, and use of those we have, in existing planes instead of purchasing new equipment, fighters. The majority of the aircraft used by France were the planes of the United States built in a factory, to the best of my knowledge.

he picks to land planes instead of single seats to the planes already here. It has a single deck, "World War II. It has eight seats on its right side and the eight seats on its left side, plus one center place to sit. We have been told that it is due to be sold to the Japanese government. It is planned as a *Yak-42*, seven passengers to the USA. It has been presented to the USA and has been presented to the UK, Australia, Japan, and France to consider. The aircraft is now being considered, existing equipment for crews instead of passenger space, so it will be

Willie L. Mai
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Hayward, California

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